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ADDRESSES AND ORIGINAL ARTICLES

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INCLUDING THE EARLY STAGES OF HUMAN DEVELOPMENT *

By Otto Grosser, M.D.

PROFESSOR OF ANATOMY IN THE GERMAN UNIVERSITY, PRAGUE

I.—GENERAL PRINCIPLES OF PLACENTATION

I am grateful for the opportunity to set out some of the deductions which the study of comparative placentation, and especially of human development, has allowed me to draw. I intend to deal in the first lecture with the general principles of placentation, in the second with the early stages of human development, and in the third with the special features of the fully formed human placenta, together with some further conclusions based on its structure.

The meaning and purpose of placentation is the transfer of nourishment from the mother to an offspring as yet incapable of active feeding—viz., an embryo or fœtus. We include in nourishment also the oxygen necessary for life; and where oxygen passes in one direction, carbonic acid always takes the opposite way, so that from the very first beginning there is at least a rudiment of reciprocity in action.

Among higher vertebrates, and especially among mammals, placental formations always involve, on the maternal side, the uterus, and on the fœtal side, the chorion, one of the fœtal membranes that envelop the fœtus until birth. Therefore placentation may be defined as the intimate junction of the mucosa of the uterus with the chorion for the purpose of exchange of material between mother and offspring in both directions, but mainly in the sense of food-supply for the latter. In the simpler forms of placentation—and it is my opinion, although not accepted by all other workers in this field, that such simpler forms are also among the phylogenetically primitive—the transfer of material from the fœtus to the mother is limited to carbonic acid, whilst other substances, and especially the urinary excretions, are stored more or less completely in a fœtal appendage, the allantois; it is only among the highest forms of placentation that these urinary substances also, in their entirety, are given back to the maternal blood and finally excreted by the maternal kidney.

There are different sources of nourishing substances in the various types of placenta. Frequently we find the glands of the uterine mucosa to be in a high state of activity. The products of their secretion may accumulate between the mucosa and chorion and by and by are taken up by the latter. We find this in a very high degree in the sheep, where the secreted fluid has been called the "uterine milk." Besides this, degenerating maternal tissue is frequently to be found among the fœtal nutriment. In the same way extravasated maternal blood and emigrated maternal leukocytes are digested and resorbed by the chorion. We may designate all this material by the general name of histiotrophe and contrast with it the material taken up by the chorion from streaming maternal blood, the hæmotrophe, the word "trophe" meaning, in Greek, food. In this way we may distinguish two kinds of fœtal food—material gained by digestion and solution of maternal tissue and its products (secretions), and material extracted directly from circulating maternal blood.

It is evident that progress in placentation must consist (1) in simplifying the transfer of material from the mother to the fœtus, in replacing the digestion of maternal tissue and secretions by the direct resorption of nutriment from the maternal blood—i.e., by substituting hæmotrophe for histiotrophe, and (2) in approximating as much as possible the circulating stream of maternal blood to that of the fœtus, as it is the blood of the mother that contains and brings all the material necessary for the building up of the fœtus and carries away the waste of life-activity.

But maternal blood can never be directly introduced into the fœtus; the circulatory channels can never directly anastomose. There are two reasons for this law—the one understood for a long time, the other derived from modern biochemical views. The first reason is the impossibility, for the embryonal vessels, to sustain maternal blood pressure, at least in the beginning of the development. In respect of the second reason, we know that the structure of the most complex organic substances, the proteins, is very manifold, varying from organ to organ, but also from species to species; so that the proteins, for instance of the liver, are not only very different from those of the kidney or the muscle, but also the proteins of muscle are peculiar to every species, so that we may distinguish them even by so simple means as taste. But besides this, even in the same species, there are differences, shown in man, for instance, by the various blood-groups, limiting the possibility of blood transference from one individual to the other to certain combinations. Frequently even the blood of mother and child are incompatible. We are justified in believing that such particularities distinguish, at least in certain of the proteins, each individual from another. The proof is given by grafts; tissue transplanted from man to man may live a certain time, but finally it is resorbed and replaced by the tissue of the bearer of the transplant, under all circumstances, even when donor and receiver are intimately related.

The Preservation of Individuality

So it is even between mother and embryo. They are different individuals; it is the chemical individuality of each of them, as well as the morphological one, that has to be guaranteed by a persistent separating wall between their blood streams. But the deeper reason for the necessity of this division is bisexual reproduction; if the union were too intimate the influence of the mother would be an overwhelming one, and, on the other hand, every pregnancy would change the constitution of the mother and assimilate her to her mate—the possibility of which was, and still is, believed by animal breeders and biologists, but has been proved to be erroneous.

So individuality is protected by the strict separation of the maternal and fœtal circulations. But it should be understood that the need of protection is not equal on both sides. The mother is an organism protected against external influences and empowered to counteract and destroy intruding alien substances, as, for instance, toxins in contagious diseases. Such protecting organs are the lymphatic system, the bone-marrow, and the liver, among others; they are missing or undeveloped in the embryonal body, and it is therefore especially the fœtus that needs protection. We shall see later on that, in the course of gestation, on one hand this need progressively

* Being the substance of three advanced lectures in Human Anatomy delivered before the University of London on May 2nd, 5th, and 6th, 1932.

decreases for the fœtus, whilst on the the other hand lack of protection under certain circumstances becomes dangerous for the mother.

In view of these restrictions, we can understand that the wall between the blood of the donor and that of the receiver of food cannot be pulled down ad libitum, and therefore it is necessary to consider the structure of this wall rather more in detail.

The chorion, with its vessels, applies itself, in the primitive types of placenta, to a normally built uterine mucosa, and the nutritive substances for the fœtus, originating from the maternal blood, have to pass through a number of tissue layers until they reach the fœtal blood. Those layers, beginning with the maternal endothelium, consist further on of maternal connective tissue, maternal uterine epithelium, fœtal (chorionic) epithelium, connective tissue and endothelium (Fig. 1).

These layers are of varying importance for the rapidity of exchange, and also for the preservation of individuality. The connective tissue is of minor importance, and the layers formed by continuous living cells, epithelium, and endothelium are of prime importance, making the exchange slower, perhaps, but at the same time controlling it. Especially for the embryo, the epithelium of the chorion is, so to say, the shell which protects it against every danger, and therefore it is a hitherto unbroken rule in placentation (at least of the real placentalia) that the epithelium of the chorion is, although perhaps modified, always and without exception preserved, and that it selects and resorbs substances only in such measure as they may be useful to the fœtus. Only towards the end of gestation does this importance

FIG. 1

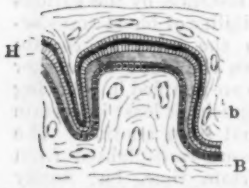

FIG. 2

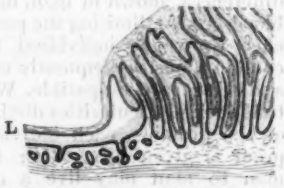

FIG. 1.—Placenta epithelio-chorialis (placenta of the pig). All the layers of the mucosa are preserved. Between the maternal and the fœtal epithelium is seen a certain amount of histiotrophe (H). b and B = fœtal and maternal blood-vessels.

FIG. 2.—Placenta syndesmo-chorialis (placenta cotyledonata of the stag). One-half of a cotyledon and a part of the chorion lævе (L) are shown. The maternal epithelium, marked by a heavy black line, is missing at the top of the septa between the villi.

diminish. With the chorionic epithelium the endothelium of the chorionic vessels also remains intact; whilst all the other layers, and especially the maternal formations, may successively be broken down till the chorionic epithelium comes into direct contact with the maternal blood and takes from it the nutriment for the fœtus.

The Various Types of Placenta

From this point of view we gain the basis for the distinction of the various forms of placenta and for their division into characteristic types. The chorion always remaining intact, the name of the maternal tissue contiguous with the chorion is used as indicator for the type.

In the simplest forms, an intact mucosa is opposed to the (intact) chorion, the uterine epithelium adjoins the chorion, and the placenta is called *epithelio-chorial* (Fig. 1). The transition of food is simplified if the uterine epithelium is shed, the chorion being now in contact with maternal connective tissue, and the placenta is called *syndesmo-chorial* (Fig. 2). Still more reduced is the mucosa in those cases in which the epithelium of the chorion reaches the maternal vascular endothelium—skeletizes, so to say, the maternal capillaries and environs them; this placental type is called *endothelio-chorial* (Fig. 3). And finally the endothelium also is broken down, and the maternal blood directly reaches the chorionic epithelium. This type we call *hæmo-chorial* (Fig. 4).

All these four types exist. The epithelio-chorial placenta is found in ungulates such as the pig and in certain of the ruminants—e.g., the cow—and it is also met with in the lemurs among primates. The syndesmo-chorial placenta is characteristic of another section of the ruminants and some exotic species, the endothelial-chorial of carnivora and a part of the insectivora and chiroptera, the hæmo-chorial of rodents, insectivora, chiroptera, monkeys, and man. In the two first-named types there is no intimate junction between uterus and chorion; the chorion may easily be stripped off as an afterbirth, whilst in the two other types mucosa and chorion form an inseparable body, so that the mucosa must be shed, at least in part, with the afterbirth. Mammals with this latter type of placenta have been called by Huxley, in 1863, deciduata, and those with the former type, adeciduata, the mucosa uteri being understood as the membrana decidua; whilst Robinson (1904) has termed the placentas of these two groups conjoined and apposed placentas.

FIG. 3

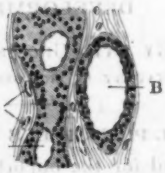

FIG. 4

FIG. 3.—Placenta endothelio-chorialis (part of the placental lamella of the cat). Trophoblast (syncytial) hatched. Maternal blood spaces lined by maternal endothelium. b and B = fœtal and maternal blood-vessels.

FIG. 4.—Placenta hæmochorialis (part of a placental lamella of the rabbit). Maternal blood spaces (S) lined only by trophoblast (syncytium, hatched). b = fœtal blood-vessels.

In the foregoing considerations it has been emphasised that the placenta forms a wall protecting the individuality of the fœtus; therefore it cannot be a simple filter or dialysing membrane through which all kinds of nutriment could pass by simple osmosis. Such is only the case for simpler chemical substances—e.g., the respiratory gases—and the crystalloid substances, such as salts, sugars, &c. The colloids, and especially the proteins, must be decomposed into their constituent parts—for instance the amino-acids—and therefore it is absolutely necessary to ascribe to the chorion a digestive and resolving power and to admit that the chorion is capable of secreting enzymes for this purpose, so that the comparison of the placenta with the mucosa of the intestine, made as long as 30 years ago by Bonnet, and later on by Hofbauer, holds good. In the same way as food is dissolved and decomposed in the intestine to afford the possibility of metabolising foreign protein into the specific protein of the individual, so also in the placenta the maternal protein is decomposed to such a degree that the formation of the specific individual protein of the fœtus is possible. It is obvious that there is only similarity, not identity, between the placenta and intestine; the decomposition of the proteins need not go so far in the former as in the latter. But it is interesting to note that the digestive power of the chorion has been demonstrated experimentally in man by exposing small pieces of the chorion on bacteriological cultivating media; these were dissolved by the chorion.

It is easily seen that all the material we have called histiotrophe must be decomposed in such a way; but the same is true for the hæmotrophe, the material taken from the circulating maternal blood. The hæmotrophe also contains specific proteins that must be prepared for the fœtus before passing into its vessels, and it will be shown later that it is a special problem in placentation how the digestive action can be exerted on the circulating maternal blood.

Obviously the different types of placentation must have originated in some way from one another. Notwithstanding, it does not seem possible to arrange

the great groups of the mammals according to their placentation into something like a phylogenetic scale. In my opinion, it is rather probable, or nearly sure, that the epithelio-chorial type of placentation must have occurred in the primitive mammals. Their derivation from reptiles seems to be well established; reptiles were the first to develop chorion and amnion, and are characterised by large, polylecithal ova (rich in vitellus), and it is probable, although not yet sufficiently explained, that this large size of the ovum was the cause of the development of the egg membranes. (Other divergent hypotheses have been put forward in the literature, but they do not seem to me to fit so well the facts.)

The now existing reptiles show gradual transitions between oviparity and viviparity, and in the reptile stage of phylogeny the junction of a complete mucosa uteri with the chorion must have started placentation. This type of placentation is still found among recent viviparous reptiles. But whilst in this way placentation must have begun with the epithelio-chorial type, it is not implied that the groups that now show this placental form must be primitive. This is especially dubious for the lemurs; probably derived from insectivores (and these possess a hæmochorial placenta), their placenta may have been secondarily simplified. In this respect, however, the recent authors come to different conclusions, and whilst Gérard leaves the question open, Hill adheres firmly to the view that the lemurine placenta is essentially primitive and has not been derived by any process of reduction from a hæmochorial type of placenta, but represents the basal type from which the placentas of other primates have evolved. With ungulates the matter is somewhat similar, they are a rather specialised stem of the mammals, and their placenta could be primitive, but may also be secondarily simplified.

Resuming the principal point in our survey of placentation, we would emphasise that the human placenta is of the hæmochorial type, the type with the simplest way of passage of nutrient materials from the maternal to the fœtal blood. But of this type there are some different modifications; these will be treated in the third lecture.

EPILEPSY AND CONDITIONS WITH SIMILAR SYMPTOMS*

WITH OBSERVATIONS ON HYPNOTIC, EPILEPTIC, TRAUMATIC, AND HYSTERICAL DISSOCIATION

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THE cause of the ancient affection, epilepsy, is unknown and we look to the biochemist for guidance. Stated briefly, the disease is a condition in which there are recurring paroxysmal discharges of energy. Research to date includes the investigation of fits produced by camphor, picrotoxin, and absinthe, the discovery of convulsant toxins in epileptic blood, and the production of fits by injections of blood withdrawn from patients in fits. Attempts are being made to desensitise tissues by administering the proteose which epileptic patients have in their urine, on the theory that epilepsy is a manifestation of allergy, as migraine and asthma are supposed to be. Recently the blood calcium, the buoy to which so much in medicine seems to be linked, has been investigated, and attempts to abort attacks have been made by countering its depletion. My own few observations on blood calcium, between attacks rather than directly before them, have shown no depletion. Lastly, it seems to be established that the blood cholesterol is low in epilepsy, particularly just after seizure.[1]

* An address delivered to the Rugby Medical Society.

The disease is no more preventable than migraine, for example, and equally incurable, although in each the development of symptoms, and in migraine the symptoms themselves, can be controlled. The manifestations of hysteria, on the other hand, a condition with superficially similar symptoms, are curable, and I believe the affection to be preventable. The fit of epilepsy, great or small, is merely one of its manifestations; it is important to remember this. To associate epilepsy with fits which are sufficiently severe to attract the attention of the patient or his friends is as erroneous as to associate abolition of the knee-jerks with tabes dorsalis. There may be not only overaction but an arrest of action, and these may be combined or the latter may follow the former. Diagnosis may be difficult.

In many diseases the history is of greater importance than the examination, and this is true of epilepsy. Scars or backwardness may suggest the condition. Backwardness may be inherited from epileptic stock or it may result from repeated attacks or limited education. It may be temporary, due to drugs or a recent fit. Bromide acne or ulceration merely indicates a drug, and in an acne patient with a story of fits epilepsy is an inference and no more. Everyone should know something about epilepsy. Many do, but some know nothing. No one knows all about it. It is incurable, and the reason which prevents a diagnosis of cure or a prognosis of curability is the length of time which sometimes passes between attacks; this may be 20 years or more. We do not know why some have this freedom, but it does not depend merely on taking medicine. Freedom may be apparent only, for attacks often occur unrecognised. Hysterical attacks show no tendency to recur in the sense of a prolonged disease. No one knows why epileptic attacks affect one man apparently only during sleep, another apparently only when he is awake. Major and minor attacks are sometimes associated, but minor attacks or fits of intermediate severity are sometimes the invariable symptom.

A boy of 12 often has these intermediate attacks at my clinic. He suddenly stares and at the same moment throws his arms above his head. The lower limbs extend, and also the spine, so that his chair tilts backwards. He remains like this for one minute. There is no sound and no convulsion.

Unusual sensations may precede an epileptic attack, but they may also represent it. The patient may be content to say nothing about them, but the condition is none the less epilepsy. An aura may precede an attack by hours or days, and there may be doubt if it was an aura or an attack. Those who knew of the aura may have no knowledge of an attack thus postponed. A man, aged 25, has had three fits in four years. In each the aura was coloured lights, and in two attacks he had time to cycle to hospital so as to have his fit there. If aura and attack are closely associated the aura is the prelude, not the cause.

For the doctor, major fits are fascinating, but minor attacks are just as interesting, if only because it is after them that the patient sometimes behaves automatically and in a way which he cannot recall and which cannot be recalled for him. In a major fit the discharge of energy is sudden and overwhelming. It exhausts itself as well as the patient. In the minor fit it also overwhelms, but perhaps only for a second of time, and it may then continue to expend itself gradually and with a simultaneous dissociation of personality. This may last for a long time. Reassociation appears to occur spontaneously in some cases

or it may result from a subsequent attack. When conduct is properly ordered during the dissociated period it may be difficult to recognise the condition, particularly if it happens to follow a first attack. I have only seen any considerable epileptic mental dissociation in the idiopathic variety. Disordered conduct may have serious consequences.

Dissociation, very similar to that of epilepsy, takes place in hysteria, both when it occurs spontaneously and also when it has been suggested by the physician. It occurs in sleep-walkers and in people in hypnotic trance. Hysterical amnesia may cure itself, or memory may return in a subsequent attack or by hypnotic suggestion. It may appear to be absolute, and yet the patient may spontaneously recall the desire which lay behind his response to conflict and, if he has disappeared from home, be able to give some account of his disappearance. Chambers and Harrowes have lately recorded a striking example of hysterical dissociation.[2] Memory is also gravely affected in some brain diseases and intoxications, and after trauma which in its turn may result from an epileptic fall. The onset of amnesia due to cerebral commotion of war without skull injury was delayed in a patient of mine for three months. It was associated with a resumption of the attributes of babyhood. Sudden spontaneous recovery occurred after two months. Korsakow's amnesia has been described in cases of encephalitis lethargica, malaria,[3] and ruptured basal aneurysm,[4] as well as in cases of alcoholic poisoning to which the original account applied. Although hysteria has a better prognosis, the hysterical and epileptic sequels of cerebral trauma have equal legal importance. An emotional stimulus has been claimed to produce epilepsy, but a fit cannot be produced by hetero-suggestion. I have not succeeded in producing epilepsy by the injection of cocaine, which has been recommended. The terms epileptic equivalent and fugue are used sometimes for epileptic dissociation, but I think they tend to confuse the issue. The condition is epilepsy.

DISSOCIATION

The epileptic patient may behave in an unusual manner apart from his attacks. This behaviour may appear a short time before a fit or represent it. Hysterical behaviour may follow a fit, and he may have coördinated convulsions or become maniacal. In the presence of a hysterical outburst it is important to remember the possibility of an epileptic onset, and if proof of this is forthcoming diagnostic emphasis should of course be on the epilepsy. Dissociation is a vastly important epileptic manifestation. Often there is no evidence of the originating minor attack, but it is agreed that an attack with unconsciousness occurs. Post-epileptic automatism is epileptic automatism. The patient is in no special degree susceptible to hetero-suggestion while he is dissociated, and his reaction to provocation may be no different from that in health. He may, however, show excessive aggressiveness, even without provocation, and may commit crime, mutilate himself, or falsely accuse another. I have no experience of crime committed during the dissociated stage of spontaneous hysteria, but the hypnotised patient will commit crime if told to do so. Reassociation in epilepsy may emerge from the committal of crime.

I have not seen dissociation after a first attack of epilepsy, but it is clear that if crime was committed in these circumstances the ingenuity of everyone would be severely taxed to secure acquittal. The condition would have originated with the unconsciousness of a minor attack which would escape observation; it would have been the first attack, and there would be no evidence that the man has epilepsy. The fact of dissociation would not necessarily have been obvious. The man would say with truth that he remembered nothing; anyone, however, may claim non-recollection, and even an epileptic patient may commit crime at a time he is not dissociated. His hope would be, first, that he might clearly have had nothing to gain by the crime, and perhaps everything to lose; and, secondly, that he might speedily show further symptoms of epilepsy. There are occasions, therefore, when it may be wise to withhold immediate treatment of supposed and even proved epilepsy. Moreover, a few patients feel all the better for being allowed to have an attack.

Motives and behaviour in hysterical dissociation, whether it is, as we say, spontaneous or in sleep-walkers or due to the hypnotist, will probably always be recalled by mental exploration. There may be a blurred memory in consciousness, but often the patient says he recalls nothing. A hypnotist can make a man commit crime while he is hypnotised, and presumably a hypnotised man will spontaneously commit crime if he is sufficiently provoked. In each case amnesia will be complete, just as it is in the dissociated period of spontaneous hysteria not due to hypnosis. The results of the so-called post-hypnotic suggestion depend in some cases at any rate on spontaneous re-entry into hypnotic sleep. Behaviour in this secondary hypnotic state is similarly unremembered but, like that in the primary state, can be recalled in subsequent hypnosis produced by the original hypnotist.

If precautions are taken in the first hypnotic sleep a new hypnotist will, I believe, be unable to make the patient recall his conduct of the first occasion, and indeed a man can be prevented from being hypnotised by another hypnotist. Prophylaxis of this sort may occur also spontaneously, and without suggestion towards it. Diagnosis between these hypnotic states, and between them on the one part and hysteria, epilepsy, and malingering on the other, may be very difficult, not only when the events are over but when we are face to face with the patient in action.

A patient escaped from the continuance of a terrifying war emotion by throwing himself at the time into deep sleep. Although he is vastly better he still reacts to subconscious memory of his emotion by going to sleep. This sleep is pathological and no one can wake him or influence him in any way. He also of course has healthy sleep, and he sometimes transfers himself spontaneously from this into his pathological sleep. In addition, he can readily be hypnotised, and from hypnotic sleep he may spontaneously enter either natural or his pathological sleep. Without hypnotising him I can of course produce pathological sleep and I can also transfer him from hypnotic sleep into his pathological sleep. Lastly, when I wake him from hypnotic sleep in which I have made suggestions for post-hypnotic behaviour, he spontaneously re-enters hypnotic sleep in order to do what I have told him. Without this re-entry he does not obey. Close observation has to be made to observe this re-entry and for a time I did not appreciate it. It may be that all so-called post-hypnotic suggestion is dependent on a similar re-entry. This patient has acquired the trick of becoming hypnotised when he hears my fingers click; it is not necessary for me to be with him, for he obeys the sound on the telephone if he is assured that it comes from me and then proceeds to do whatever I tell him. In the event of his committing crime the solution might be impossible for, in his subsequent reassociated state, he would remember nothing except that he had answered my telephone call and even that he would not remember if after he had been hypnotised I had thought to tell him not to. If I hypnotise him in person or by telephone, say, at 10 o'clock and tell him to telephone to me at 5 and then wake him he waits until 5 and then spontaneously comes again under my influence in order to telephone, and in this case also, in subsequent reassociation, he does not recall going to the telephone. The most he

could say, if asked, and it would be true, would be that about 5 o'clock he must have gone to sleep. He might not have seen me that day or had any knowledge where I was. For myself, I could prove that I was many miles away, perhaps abroad. He has always spontaneously resisted the attempts of others to hypnotise him, but I believe that I could prevent him repeating my suggestions to anyone else who happened to be successful.

These multiple forms of sleep—natural, pathological, hypnotic—occurring in the same man and in varying sequence may clearly make it difficult to identify the particular variety existing at any moment. I have quoted the case because there is urgent reason in conditions of dissociation to listen attentively, observe carefully, and think clearly, keeping in mind what may be important and what is unimportant. It is apt to be regarded somewhat vaguely for want of fixed points, and these are few enough. As regards epilepsy versus hysteria, it is wise to try to know epilepsy, for although it is difficult it is less so, I believe, than hysteria.

The following two cases illustrate the similarity and contrast between the amnesia and automatic behaviour of epilepsy and hysteria respectively. The conditions may be so alike that, without further evidence of epilepsy, it may be impossible at first to make a correct diagnosis. In each disease the results of automatism and amnesia may be serious, both for the patient and others. It seems that anyone may be in a state of either epileptic or hysterical dissociation without being aware of it either at the time or later, and without others being aware of it.

A case of epileptic automatism and amnesia.—A domestic servant, aged 21, continued to sit in a bus after it had reached its destination at Victoria on the afternoon of Nov. 10th, 1930. She had travelled in it from Caterham and had paid her fare. She could not give any account of herself or where she wished to go. She was taken into a teashop and thence by the police to hospital. When I saw her next morning she was alert and intelligent, but she was unable to give her name or age, her address or religion, or her birthday. She knew nothing of her parents or her family. When I asked her how long she had been in bed she replied "A long while." She complained a little of headache, but she showed no evidence of physical disease. She did not know the significance of the wireless headphones, but she gave correctly the number of months in a year and the number of pennies in a shilling. She recalled only a few consecutive letters in the alphabet, but said Z was the last. She knew that December is the month of Christmas. A few hours later she said "Good afternoon, do you know where they have red table-cloths in a big place? Where they are, I felt giddy as I sat at a table. The lights went on. Things went black. I was offered vinegar. A policeman was there."

The same evening her mother came to the hospital in response to a wireless call. The parents, anticipating that the girl might be late returning home the previous day, had gone to bed leaving the hall light burning, to find it still burning the next morning. The girl recognised her mother and said at once that she lived at Godstone. Shortly afterwards her recovery was complete.

The story was that she had left home early on Nov. 10th to go to her work at Caterham. She had a headache. While at work she became giddy and knocked her head against a door, which made the headache worse. Finding that she could have the half-day off, she decided to go home to bed. On the way she called at a shop but found it closed. From that moment she recalled nothing until she found herself in a London teashop at 6 in the evening, five hours later, and the incidents of this period have remained blotted out of her consciousness. She has been liable since she was 11 years old to attacks of giddiness and fainting, lasting ten minutes, without warning and without sufficient cause. In these attacks she has stopped talking and become congested, but there has been no convulsion and no apparent unconsciousness. Her mother has ascribed the attacks to the menses. During August, 1930, she had a more severe attack, lasting half the day. She was very sleepy that day and the next. She is liable to severe headaches, and during these she has done things of which she has no recollection, but she has not previously had a serious loss of memory. She recalled later that in an attack 18 months before she fell. This case clearly is one of epilepsy, continuing from 11 to 21, untreated because unrecognised.

A case of hysterical amnesia.—A nurse, aged 19, employed for the past year at a convalescent home, was sent to me on Oct. 27th, 1931. Her previous history contained no event which had any bearing on her illness. On Oct. 3rd she started for a bicycle ride with a friend. She collided with some patients at the gate but she did not hurt either them or herself or damage the bicycle, which was borrowed. It was her first ride, after learning to bicycle. She thought that the handle-bar may have hit her head, but she had no pain. The ride was abandoned, and she walked back with her friend to the nurses' home. During this short walk she developed a violent headache and was urged to sit down. She then had a severe hysterical attack in the presence of the nurses, shaking and struggling so much that she was held down. She was put to bed, where the doctor found her lying fully extended and rigid and with the head retracted. There were no bruises. When she came to herself an hour later she did not recall the attack. She did not know where she was and she did not recognise the nurses. She did not recognise her mother who came to see her in the afternoon and she did not know any detail of her life. She recognised objects, however, and their uses. She referred vaguely to walking along the corridor of a train, alluding probably to the corridor in the house. She was kept in bed for ten days, complaining only of slight headache.

On Oct. 25th suddenly, when conversing about the election, she recovered the memory of her life to the age of 12, when it appeared that she had experienced an election. Two days later, three and a half weeks after the accident, and on the day I saw her first, her memory subsequent to the accident was clear, but there was a complete gap in it for the period between the ages of 12 and 19. She knew her name, age, and birthday, and she recalled the incidents of school. She had no headache and there was no evidence of physical disease. The tendon-jerks were exaggerated throughout. She was quiet and helpful.

Two days later, Oct. 29th, her memory gap was only between the ages of 18 and 19, and this gap included the day of the accident and the period directly following it. People about her whom she had known before the accident she knew merely as friends made since. On Nov. 2nd she reacted mildly with tears when she realised that she ought to know a friend but did not. On Nov. 3rd the gap between the ages of 18 and 19 became filled, and the next day her memory was clear for everything save for the accident and the events which immediately followed it.

SOME INCIDENTS IN EPILEPTIC ATTACKS

I have read the notes of 40 epileptic patients to provide illustrations of some of the phenomena which interested me. One had his first attack at 19, at the moment of a high dive. He was rescued and lived to have more attacks. A boy made 40 runs, but wanted to know why he had not had his innings. A man of 34, with myotonia congenita since 15, had epilepsy superimposed at 19. Some patients say that in their minor attacks they cannot let things go, and this is also a symptom in myotonia. A man of 35 unshipped in his epileptic fall the gas mantle in the room below; his two attacks, separated by a year, both occurred when he was playing the piano. A girl commenced to menstruate during her first fit at 14; this was coincidence, for the menses had started at 12 and were regular.

Odd behaviour is common, and it may happen before or after an attack or instead of it. A boy of 19 undressed and went to bed on a June afternoon and slept, thinking it was bedtime. A woman of 57, whose attacks started as late as 56, demonstrated them by merely looking over her shoulder. She followed this up by going into strange houses and asking, "Where are the others?" thinking she was at home. We witnessed many minor attacks before giving luminal, which promptly stopped them. This incorrect feeling of familiarity with persons and places is common. The invariable warning in one child of 9 is a nasty taste which she says wakes her. At the start of a fit her hand is always found at her mouth. A woman of 27 whose disease dates from 17 knows of her fits, which occur only in sleep, by loss of taste when she wakes. A servant of 38, affected four years, used to walk backwards in the

street. Then she turned her skirt up and looked under it. Once, having laid the table for a party and announced dinner, she cleared the table before the guests reached the room. Another time she decanted a bottle of wine down her master's neck. The relation of these incidents to her work drove her to suicide, and she wrote to tell me where her body would be found. A girl of 12 with petit mal since 9 often had 12 attacks a day. After a momentary blank she merely said "Pardon," but invariably she wetted herself. A man of 46, affected four years, always demanded coitus after an attack. During the married life of a woman of 33, who had been affected 15 years, the fit was always preceded by unfounded suspicions of her husband's fidelity. The attack over, she was once again the devoted wife. A man of 23 travelled from London to Southend in 1920 without reason, and two months later he went to Aylesbury. The only episode before these was an attack of momentary unconsciousness at 14 which he had forgotten. A man of 56, with epilepsy awake and asleep for three years, arrived home in the country unexpectedly. He talked of his journey, and his wife thought that he had come back to rest after an attack. Half an hour later he asked why he was there, and said he remembered nothing between waiting his turn for a shave in London and that moment.

Lastly, in 1916 I saw a man of 29, an artificer in the *Queen Mary*, who three weeks after the battle of Jutland reported at an aerodrome but could give no account of himself. He said that he had come to himself that day, and that his last recollection was of his ship being struck. He identified his name and ship only when he was shown a Navy list, and then he remembered that he lived at Portsmouth, but not the address. His wife had assumed his death until, three days after Jutland, he telegraphed for money from an Edinburgh hotel. But on inquiry no one knew of him there. He recalled incidents in his ship right up to the date of the battle, and these I happened to be able to verify. There were but four survivors of the *Queen Mary*, and he was not among them. Probably he had a fit ashore before the ship sailed and weaved a newspaper account of the battle into his experience of ship life. He had occasional attacks before this, starting at 25.

EPILEPSY AND MARRIAGE

Epileptic stock may show examples of consanguinity, epilepsy, or insanity. So does the stock of many healthy people. Epileptic patients appear to inherit something which, for want of a precise pathology, is called an unstable disposition, and if it were proved that without this there is no epilepsy the disease would be wiped out by sterilising epileptic people and those who or whose stock are unsound. The question of forbidding an epileptic patient to marry hardly enters into the matter, for epileptic people are potential parents like anyone else, even though they are segregated. This, however, does nothing to invalidate the need of a close inquiry into personal and family health when marriage and propagation of children are contemplated. On the other hand, too close an inquiry on these lines might have the effect of abolishing all marriages. The influence of community welfare on individual action is far less powerful, unhappily, than that of community danger, for example war. The interval between attacks is sometimes so long that the first attack, even if understood at the time, may be forgotten. A man of 60 has had three attacks in the last six months, never before; but 27 years ago he had a brief illness in which for a moment he lost his sight. The consequences of such forgetfulness may be disastrous to others.

Diagnosis of transient ill-health should be attempted no less than in the case of other illness. A man, aged 34, whom I saw in 1918, had an attack of epilepsy in 1912 when he was in bed asleep on his wedding night. It appeared to be the first attack, but in the previous year he had fallen out of a dog-cart. The fall had been ascribed to the ordinary perils of driving, but it was not so. He fell out in an attack of epilepsy. The reasons for the continued efforts to keep alive proved epileptic imbeciles are often a subject of criticism, but arguments in favour of the legal killing, if the parents desire it, of children who are gravely affected mentally and also of sterilisation, lose force in the light of the following case.

A child of 4 was regarded by his parents as simple-minded. With me, during the whole of 40 minutes' consultation, he did not articulate. Instead of walking, he hopped. During lumbar puncture he was ridiculously quiet, and I regarded him as an epileptic imbecile. After three years' treatment he improved out of knowledge and when he was 15, that is after a further eight years, he wrote at his parents' instruction to report that he was quite well.

RELATIONSHIP BETWEEN SYMPTOMATIC AND IDIOPATHIC EPILEPSY

The stock of an epileptic patient cannot be recognised as unsound in every case, and it may be as good as or better than that of healthy people. In some patients there is a story of convulsions in infancy, due perhaps to brain trauma at birth or later, or to scarlet fever or intestinal parasites. Even although the probable cause is detected and removed, the brain may nevertheless remain liable to the recurring paroxysmal discharges of energy which is epilepsy. It is as if a first convulsion, whatever the cause may have been, renders the brain liable to repetition, just as the striking of a clock through the week depends on the stimulus applied on Sunday morning. I have two recent cases which show this relationship between symptomatic and idiopathic epilepsy.

A child fell out of a pram at four months. There were no witnesses. Right-sided weakness and right-sided fits terminating in unconsciousness followed almost at once. The child became left-handed. Polio-encephalitis was diagnosed. From 6 to 15 there were no attacks, but the weakness remained. The attacks then recurred suddenly and without obvious cause. I saw the boy first in 1925, at 15. The right lower limb was notably weak. The scalp and skull were healthy, also the optic discs and cerebro-spinal fluid. The diagnosis was a meningeal blood tumour, caused by the fall at 4 months. Mr. Rock Carling removed the tumour, which was organised blood, and replaced the bone flap. Bromide was ordered. The boy rapidly recovered power and became once again right-handed. For precisely two years he had no attacks, but then generalised epilepsy started in spite of treatment. For nine months the attacks were very slight, but since 1928, at 18, they have been grave.

The second case is that of a young woman who for two years was treated for idiopathic epilepsy. Papilloedema then developed and she came under my care. Close observation and a fresh history indicated that the attacks throughout were due to focal disease, passing quickly into generalised epilepsy. Tests for syphilis were all positive and intracranial gumma was diagnosed. Treatment cautiously conducted was followed immediately, as had been prophesied, by a great increase in the number and severity of the attacks, which, as it happened, had been less frequent during the few previous months. But the papilloedema subsided and in spite of the fits she felt a great deal better. Directly the course of arsenic was completed the fits stopped abruptly, but after a short time they recurred, although in a milder form and without any Jacksonian element. I regard these latter attacks as idiopathic epilepsy which need luminal. This controls them completely, but further treatment for syphilis is necessary in addition.

The conception of trauma to mind or brain, particularly in early life, as a cause of epilepsy makes it a

miracle that some of us escape epilepsy, just as another miracle, to those who know the body, is not that we die but that we live. The greatest care should be taken to prevent birth injury and also to guard the child from mental wounds. Think of the child running free who finds a man lying dead. An attack which immediately follows an emotional shock is more likely to be hysterical than epileptic. It may possibly prevent the occurrence of epilepsy by taking its place. Convulsions of infancy should be anticipated by correct hygiene, and luminal, continued for two or three years, may be valuable for all babies whose birth has been difficult. After brain injury at any age, whether surgical or otherwise, sedatives should be given for at least a year, even although no fits have occurred. Head injuries, especially those in children, which may appear trifling, are not lightly to be dismissed. When epilepsy has developed every effort should be made to prevent an attack, save in the few cases which are referred to elsewhere.

I have enumerated some of the varieties of stimulus far removed from the brain which are believed to cause convulsions. Retarded physical development, such as occurs in rickets with its delayed dentition and with the convulsions which are popularly ascribed to dentition, may go hand in hand with a mental development which is unretarded. In this case the brain may be supposed to have an excess of function which, though unusable at the moment, is ready to overact reflexly to stimuli and cause conditions such as tetany, laryngismus stridulus, and convulsions. Epilepsy may date from these, and signs of tetany such as interosseal spasm of the fingers sometimes occur during the epileptic attack. Attacks of epilepsy may alternate with those of tetany. It is wise always to search for a possible source of stimulus of epileptic attacks.

A CASE OF EPILEPSY DUE APPARENTLY TO IMPACTED WISDOM TEETH

A woman, aged 32, married for three years but without pregnancy, was sent to me in February, 1930, nearly three years ago. During the previous eight months, never before, she had had five severe attacks of epilepsy, each one in sleep. They had not waked her, but in the morning she had vomited and complained of headache. She had no knowledge that the doctor had seen her. Her husband, wakened by her cry, found her sitting up in bed, and at once she fell back rigid. She was grey, with froth about the lips, and the hands were clenched. The eyes were stated to have deviated upwards and inwards. The tongue was bitten; the sphincters controlled. In two of the attacks only was there a clonic stage. The aura was no less than 12 hours previously and consisted of severe palpitation which lasted a minute. Once she had an attack of momentary headache and blindness some hours before the fit. She was admitted to hospital and her medicine was stopped. No attacks occurred. Three wisdom teeth were unerupted owing to impaction; the fourth, also impacted, had previously been extracted. The three impacted teeth were extracted and, although no other treatment has been given, there have been no further attacks.

THE HISTORY AND EXAMINATION

A patient attends complaining of attacks. It may be clear by looking at him that he has epilepsy; his scars, however, may be hidden and, again, he may be unscarred. The whole head should be examined for scars, including the neck below the chin. Occasionally the fall is forward, yet with neck extended, and opisthotonus may occur therefore at the moment of the attack. More often, however, it is seen in the later clonic stage, but it is an unusual feature of epilepsy.

A doctor wrote that as he found a man sitting on his wife's chest he inferred that she was violent and therefore hysterical. But the attack was pure epilepsy, one of many, and the man was doing his best to prevent her hurting herself as her spine alternately arched and relaxed. The attacks started at 14, recurring at 21 and 32. She had not been treated. She married at 17 and again at 30. We witnessed many minor attacks. She had never hurt herself or been incontinent. She said that before an attack she always felt hot and wanted to fight.

I say pure epilepsy for a reason. Some authors write of hystero-epilepsy, a term which may lead to a confusion of thought which is to be avoided. It means hysteria, but with certain manifestations which simulate epilepsy. There is, on the other hand, the expression post-epileptic hysteria, in which the epileptic attack fails to pass naturally to its completion and the final stage is hysteria. But the condition is epilepsy. Epilepsy may present itself by paroxysmal outbursts of uncontrolled temper without attacks, and epileptic attacks and outbursts of temper may occur alternately.

The patient's story, especially about major attacks, may be conclusive of epilepsy, as much because of its limitations as in spite of them. The public, knowing a little about epilepsy, are apt to embroider the story. A witness is, nevertheless, always desirable and often essential for a diagnosis. The fact that attacks have occurred when the patient is alone is significant, but it may be conclusive only if he is able to say that no one was within hearing.

I saw a lady who had severe attacks of doubtful nature which she ascribed to a motor accident. The point had been made in favour of epilepsy that some of the attacks had occurred when she was quite alone in her house. She meant by this that they occurred during her husband's absence, but I found that the maid, although not always in the room at the time, had on each occasion been in the adjoining kitchen and that the patient was aware of this.

Epilepsy occurs under any conditions, but it is at least doubtful if attacks of hysteria take place when there is no possibility of an audience. It may be asked whether any manifestation of hysteria occurs or persists in the absence of an audience. Sleep-walking, when it takes place in response to a dream and is not a manifestation of epileptic automatism occurring in sleep, may be included among the signs of hysteria, and there is never any evidence that the patient seeks an audience; but the boundary of hysteria must be extended, perhaps unjustifiably, in order to include sleep-walking. If the dissociation of hypnotic suggestion is regarded as evidence of hysteria it is also an example of hysteria which demands no audience, for it may be produced via the telephone. In the patient referred to above, an attack of hysteria can be suggested by telephone and occurs, if it is so ordered, in the absence of an audience and after I have left the telephone. If, therefore, the terms in use are accurate, it is not true that the absence of an audience is sufficient evidence on which a diagnosis of hysteria may safely be excluded. If hysteria imposes itself on a patient who is quite alone, apart from the illustrations just given, the symptom is probably short-lived, being spontaneously aborted.

A feature of epilepsy is paroxysm, and this applies to nervous discharges on the sensory side as well as on the motor. An attack is usually a replica of other attacks. The threatened motor discharge can sometimes be checked by increasing or creating a sensory impression by means of grip or ligature. Sometimes the discharge is sufficient merely to arrest function, and a parcel is dropped. I have several patients whose warnings are so adequate and timely that no one knows of their attacks, for they are able to retire to the lavatory or elsewhere. A few patients utter a cry as the attack grips them. It is said to be expiratory. I have heard it once only and I shall never forget it. I thought it was inspiratory, but with the cords opposed. Inspiratory laryngeal

sounds are common. A patient sometimes recalls his cry or at least the beginning of it, and when the attack is over and he finds himself lying exhausted on the ground it is the first as well as the last thing which he remembers. Other patients recall starting to fall, but they do not remember making contact with the ground. If a child is heard to cry out in sleep it is not wise always to assume that he is dreaming.

Once a condition has been labelled it may be difficult for the patient to escape from the diagnosis, and in the matter of epilepsy it is particularly important to be accurate. There are patients from whom the consultant alone may obtain the complete history, merely because of his independent position, in contrast with that of the local practitioner.

A young man had two attacks at a short interval in June, 1932, which had suggested a diagnosis of minor epilepsy. On each occasion, as he was trying to sleep, suddenly for a few moments he could not open his eyes or move his position. He tried to call out but his voice was too weak to carry; however, at last he managed to attract attention by knocking a chair over. The story was that some years ago he had fought a man and, as he thought, killed him. He fled from his country and has had no communication with it since. Recently he has become engaged and the girl's parents are seeking evidence from him of his home and family. They do not know his story. He cabled, hoping that a reply would tell him what he has never known, did the man die or, on the other hand, has he never been wanted by the police? The attacks occurred a few hours before the reply was due. The patient told me that he would have accepted a diagnosis of epilepsy rather than tell the doctor his story; in fact he had failed to associate his attacks with his anxiety.

My habit is to admit all patients who have attacks of any kind in the hope of observing one. No treatment is given until a firm diagnosis has been made. Even when the condition has been diagnosed it is wise to readmit the patient for stock-taking at regular intervals. A diagnosis of idiopathic epilepsy may need revision even after many years, and there is much comfort in the knowledge that the optic discs remain persistently healthy and in the assurance, rather than the hope, that the cerebro-spinal fluid is normal. The doctor should remember from the moment the patient is with him that an attack may occur. A patient of mine, a man of 42, had an attack of epilepsy in the moment before lumbar puncture. Any epileptic attack may pass into status epilepticus. The patient should be seated in front of the doctor during the consultation, for minor attacks are easily missed. The doctor should always be ahead of any emergency. There should be space so that an attack will not endanger the patient, and it is useful to have a stop-watch at hand. Because physical signs may alter in an attack and because it is important to know that they are fresh the man is best examined at once, before the story is elicited. Epileptic and other attacks are exceptions from this point of view to the general rule that the history of symptoms is more important for diagnosis than the clinical examination. In anticipation of an attack the boots should be removed and the collar undone. The pulse-rate, the colour, the state of the shirt as regards urine, the pupil reaction, the condition of the tendon-jerks and plantar reflexes, the teeth, and the size and state of dentures should be noted. All this takes but a moment, and the knowledge gained gives power and confidence in the presence of an attack. The teeth are examined because they may become dislodged, and because when breathing stops in the tonic stage the cyanosis may be so extreme as to suggest suffocation. Even a doctor may be taken off his guard, for I know a case in which tracheotomy was performed for the cyanosis of cerebral hæmorrhage. He thought the denture must have been unseated, but it was in the man's locker. The importance of the pulse-rate is that a slowed rate in an attack may be the means of diagnosing a cardiac or vasovagal attack. A midshipman in my battle-cruiser suddenly became unconscious in my presence and fell as though struck down. There was no convulsion. The pulse-rate was 40. At Zeebrugge a year later he won the D.S.O. On the other hand, epilepsy does not always show convulsions.

DIFFERENTIAL DIAGNOSIS

It is one thing to diagnose epilepsy correctly when a minor or major attack is witnessed from start to finish, but it is otherwise if we have to rely on the accounts of observers. The auras are as varied as the possible sensory impressions are numerous. It is always important to listen attentively to the details about them. They occur in hysteria also, and both in epilepsy and hysteria they are important, but for different reasons. If the hysterical patient can recall any premonitory sensation we can make use of it by suggesting its occurrence and then linking to it an attack which we can observe. The sensation of globus, for example, often occurs in hysteria as well as in epilepsy, and a hysterical attack may be suggested by spraying the throat with ethyl chloride. Sometimes an aura has to be invented. Although the epileptic aura may be prominent the fit may be slight or absent altogether. Taste and smell auras are common.

Non-epileptic conditions may superficially resemble epilepsy. Vasovagal attacks have been mentioned. The eyes may be fixed and staring in hysteria, but a squint is unusual. I have observed one patient, however, who squinted convergently owing to a hysterical spasm of both internal recti. It occurred sometimes when she looked in front of her and always when she tried to look up. Upward movement was incomplete owing to an additional spasm of the depressor muscles. The condition was rapidly cured. Conjugate deviation of head and eyes has not occurred in my cases of hysteria, but upward rotation of the eyes is common. As a rule it does not take place until the moment the doctor opens the lids. Upward rotation occurs also in a few cases of encephalitis lethargica. In hypnotic sleep, at the moment of transference, the eyes often pass upwards through a range which voluntarily is impossible. If the patient is then told to bring the eyes to the horizontal he closes the lids to do so. But he can be taught not to shut the lids or rotate the eyes, although under close observation it is clear that it is an effort not to do so. Corneal anæsthesia may be a hysterical manifestation, but in hysterical attacks the cornea is usually sensitive, although sensibility can readily be abolished by suggestion. Opisthotonus and the ambiguities of tongue-biting have been referred to. The epileptic malingerer may remember to bite his tongue and wet himself, but he cannot control his pupils or corneal sense during his performance. In epilepsy, as in any other disease, incontinence depends on the presence of urine and fæces. Nevertheless the fact that the bladder and rectum are full does not always mean that incontinence will occur. In epilepsy it is probably due to muscular spasm rather than relaxation, for often it is forcible but, this notwithstanding, incontinence occurs in many minor attacks. I am uncertain of the relationship of incontinence to unconsciousness. We do not look for it in cases of fainting, but I have witnessed incontinence of urine in a man who fainted for the first time at 74 and for not more than a minute. He had been helped from bed to a chair and my knowledge of his faint was gained by the sound

of his urine falling on the floor. Taken with other signs it may be used as a criterion of the moment of death. On the other hand, the bladder is often found distended at autopsy, particularly when death has occurred suddenly. Bloodless transfixion of the skin occurs so often in cutaneous anæsthesia from organic disease, and also with certain precautions in people who are apparently healthy, that it cannot be relied upon as a criterion that the sensory loss is hysterical. Dermographia, often associated in the past with a diagnosis of hysteria, but now sought as commonly in suspected vagotonia as in neurosis, is similarly unreliable.

The behaviour of some epileptic patients just before the attack is interesting. They turn round or walk backwards or run and then fall. If giddiness preceded the attack Ménière's disease has to be considered. In this, as a rule, the patient has auditory symptoms between the attacks as well as at the onset.

A porter, aged 36, was admitted unconscious in 1931. The temperature was 96° F. and there was coarse lateral nystagmus. He was not incontinent. On recovery, after two or three hours, he said that he had been seized with a sudden severe attack of giddiness and at once had buzzing sounds in his ears and became deaf. He tried to sit down, but vomited and sweated profusely. This was his last recollection. He was seen to pitch heavily on to the platform. It was his third attack. The first, 18 months before, had been preceded by headache and lasted for four days. The second, six weeks before, had lasted a day. Between the attacks he had been well save for some headache and a little deafness. There were no aural noises. The labyrinthine tests proved healthy.

The case illustrates the importance of distinguishing Ménière's disease from epilepsy, although it is possible that better knowledge will show that Ménière's disease is a form of epilepsy. The sudden pitching to the ground is the same in each. Had the man fallen under a train there would have been the alternative diagnosis of suicide.

Consciousness is usually lost in epilepsy, but if the attack is short the patient may be unaware of it. It is not always easy to be sure about unconsciousness, and the doctor may sometimes get help by a ruse such as pocket-picking in order to watch the patient's immediate or ultimate reaction. In hysteria consciousness is sometimes gravely affected, and, according to the patient, may be abolished. In epilepsy unconsciousness should be regarded merely as one of the symptoms, although it is often a paramount one. Usually, but not always, there is muscular spasm. Even when there is no unconsciousness, as when the attack is wholly represented by a sensation, the condition is epilepsy. The expression "epileptiform" does nothing to assist clear thinking.

AGE- AND SEX-INCIDENCE

Epilepsy and also hysteria may occur at any age after the first year. One-eighth of the cases of epilepsy are said to start between 1 and 3. No less than 75 per cent. of them have their first attacks between 12 and 20. The last figures apply also to attacks of hysteria, although its other manifestations occur at any age. In my series of 40 epileptic patients there are 7 in whom the onset was before 10, and of these one started at 2 and another at 3; 15 started between 10 and 20, and 6 after 30, the latest onset being at 56. Very occasionally, in about 1 case in 200, the disease begins after 60. When the onset is after 30, disease of skull or brain, such as tumour, general paralysis, or lead poisoning, must be considered. Accurate diagnosis may require great care.

This year I saw a man of 63 whose fits were stated to have begun at that age. Further inquiry showed the onset at 56, late enough for doubt about idiopathic epilepsy, but seven years earlier than had been stated. A second attack had occurred at 63, and three more, of which two were during sleep, in the two months before his admission. In the ward we witnessed his fifth attack. All were major fits. Superficially he resembled a case of general paralysis. He had slight dysarthria, but otherwise no tremor. He said that Alexandra is Queen, that Woolwich, where he worked for 30 years, is the capital of England, and that £2 contained 60 shillings. In writing his address he shortened the word street to s. Nevertheless he has idiopathic epilepsy and not general paralysis.

There is little to be gained by working out the sex-ratio of epilepsy. Females are said to exceed males in young life and at puberty. This applies also to hysteria as regards attacks, but at no age are males less susceptible than females to its other manifestations. In middle life, after 35, epileptic males exceed females.

TREATMENT OF THE ATTACK

Epileptic attacks as a rule are sudden and brief. The fall tends always to be in the same direction, but this is not invariable. When a fall is witnessed or known to have occurred the whole head and body should be carefully examined for injuries. A scalp wound demands attention, although grave injury may occur without it.

A man fell heavily but unseen on a London bridge at 9 A.M. Recovery appeared to be complete, but the police, suspecting epilepsy although the attack was a solitary one in a life of 40 years, took him to hospital. The casualty officer proved to be an acquaintance, and conversation instead of examination was carried on until the drowsy patient became unconscious while he spoke. He was admitted and died in half an hour. A small occipital wound was found, caused by the tram-line, and beneath it a fractured skull.

A man may sustain his first injury after a series of attacks lasting many years.

A patient, aged 53, has had attacks for 20 years. This year he fractured his skull when he fell but he recovered and seemed none the worse. Three months later, however, he started to wake up his wife and threaten her with violence. He slept afterwards, waking without headache and without knowledge of what he had done. In spite of the recent brain injury his conduct is probably the direct sequel of minor attacks in sleep. Separate beds have been recommended, for clearly it is unwise for the wife to share this man's bed, and yet he should not sleep alone. A doubled dose of medicine at night has helped him.

If the initial tonic stage of the attack is long enough there is cyanosis, but before this, at the very moment of the attack, the lips are pale. In brief attacks pallor may be the only change, and it is important to listen carefully to the witness. When cyanosis occurs in hysterical attacks it is due as a rule to the man-handling which the patient has received. The eyes in epilepsy are often deviated and fixed, but usually without squint. If upward rotation occurs it is through a range which cannot be covered voluntarily. The head also may be deviated. The lids may be either open or closed. The cornea is anæsthetic and the pupils are dilated. It is the overwhelming tonic spasm which hurls the man to the ground. The unconsciousness which precedes or accompanies the spasm would of itself merely cause him to crumple up and collapse. Unless the tongue is lying snuggly inside the mouth it may be bitten at this stage, and it is idle to try to prevent this. Some patients have a warning as of their teeth being loose and they have time to remove their plates or slip in a gag. The moment for the witness to prevent tongue-biting is in the subsequent clonic stage, and he should seize his opportunity to insert a gag and not blindly force it between the teeth. But the story or evidence of tongue-biting is not to be taken as proof of epilepsy, for it may occur in a seizure from any cause. Involuntary tongue-biting in health is common, although it is seldom severe and usually

leaves no scar. The tongue, even after death, should be examined for scars. Many epileptic patients never bite the tongue, but the blood caused by violence to the mouth is attributed to a bite.

Injury, but as a rule less serious, may occur in the clonic stage, either from the hammering of the head and limbs on the floor or from dislocations. Rarely a dislocation occurs in the tonic spasm. A display of saliva is frequent, and it is blood-stained if the tongue has been bitten or the teeth dislodged. It is forced from the mouth by the violence of the thoracic clonus. Mental and physical exhaustion follow as a rule, and during it the man may open his eyes and look about him. The hysterical patient may also look around, and indeed may be expected to do so, but in this case the action is purposive so as to study the reaction of others. It may be momentary, but it must not be missed.

Usually it is inconvenient or impossible to examine the patient during the tonic and clonic stages, but when the attack has spent itself the clothing should be examined and the reflexes tested. The plantar responses may be extensor and the tendon-jerks abolished, and these alterations may persist for an hour or more. If the attack is largely one-sided, resembling the Jacksonian attack of organic disease, the reflexes may be affected on that side alone. I have seen one case in which, throughout the five days of coma which followed status epilepticus, the tendon-jerks were abolished unilaterally. The plantar response on that side, as on the other, remained flexor.

The stage of exhaustion passes as a rule into deep sleep from which the patient wakes with headache. There may be headache but no sleep. In spite of the headache he may say that he feels all the better for the attack. Vomiting with unawareness and suffocation are the dangers to life during epileptic exhaustion. Many patients turn over prone and bury the face in the pillow. These apart, the risks to life are few. They depend on the position of the patient when he is seized and on the severity of the trauma in falling. Status epilepticus has special causes of death. The condition should be remembered for any epileptic attack may pass into it. When recovery is complete dislocations should be looked for. Although therefore there is much that a doctor may do during an attack, it is chiefly in knowing what to observe, and in observing, that he will most usefully be engaged. If the attack is in the street he will do best if, in addition to observing, he prevents onlookers making mistakes.

STATUS EPILEPTICUS

Status epilepticus and also any prolonged attack of epilepsy should always be regarded with anxiety. Four hundred attacks in 24 hours have been recorded. Luminal-sodium in 5-grain doses may be given intravenously, and 10 c.cm. doses of calcium gluconate have been injected into the blood stream. Nitroglycerine or hyoscine helps some patients, and morphia used cautiously and in small doses may be tried. Lumbar puncture has proved useless in my hands. Chloroform, and chloral and bromide by stomach-tube or rectum are often useful, and the value of large doses of paraldehyde given in olive oil by rectum should be remembered. Tube-feeding must be employed. If starvation has accompanied the illness the urine will be full of ketones. There is usually pyrexia in status epilepticus, and this is the only form of epilepsy in which it occurs.

TREATMENT BETWEEN THE ATTACKS

In its broad aspect, effective treatment is just as difficult now as it has always been. If the patient is to learn the diagnosis I prefer him to learn it from me. In any case I do not understand that benefit can accompany mystery. Many doctors hold that the patient should continue to follow his ordinary life and employment, and this I believe is wise. There are many fortunate patients whose security of tenure in their work has not been lessened, although their employers have witnessed their attacks. From what has been said it is clear that every possible effort should be made to prevent healthy children observing attacks, and it is as much from this point of view as from that of the benefit to the patient that colony life is desirable. Permission to work for a scholarship is a matter for special consideration in each individual case. Attacks should always be recorded on a chart. Alcohol is best avoided, certainly as a regular luxury. The modern tight-fitting collar should be discarded, and this not for epilepsy alone. Dentures should be intact and large, and the risks from broken glasses remembered. In many cases a country life and the avoidance of late hours and crowds is best. Danger rules apply not only to the man but to the public, and should be considered chiefly in respect of engine and car driving, flying, signalling, dispensing, jay-walking, fishing, bathing, unprotected windows, ladders and scaffolding, locked doors, standing at the edge of platforms, sleeping alone.

A host of drugs has been used. The list includes bromides and sedobrol, belladonna, borax, digitalis, Indian hemp, silver nitrate, zinc, and arsenic. Arsenic prevents the psoriasis which borax sometimes causes. It helps to prevent bromide acne and ulceration. Acne is common apart from bromide, and often just those patients have it for whom bromide is contemplated. The evils of arsenic should be remembered as well as its benefits. Pigmentation may occur, but arsenical neuritis is as common, and the continued activity of the ankle-jerks should therefore be proved. Gelineau's dragées have often been given with success. They contain bromide of potassium, antimony, arsenic, and picrotoxin. Luminal and gardenal are the drugs in modern use. Large doses are not recommended, but it is useful to know that tolerance may be considerable. I have recorded the case of a woman who recovered completely from the effects of luminal, grs. 120, taken in the course of 12 days.[5]

The basis of therapy by cerebral sedatives is not to cure the disease but to prevent the undesirable repetition of the attacks. Every attack makes another more likely. Continuous perseverance is necessary, and an attempt should be made by timely dosage to anticipate an attack. Many patients, for example, have their attacks at particular times, directly they wake or while they are dressing. The only time when sedatives may safely be omitted for some days is during a pyrexial illness.

Special diets, formerly fashionable, are now less used. The latest is the ketogenic diet. This causes acetonæmia, which should act as a damper to cerebral activity. This and other measures which deplete the alkali reserve of the body serve also to deplete the body of fluids, and it has been hoped to show that epilepsy is benefited by such depletion. I have had no success in the few cases I have treated on these lines. In the worst case of status epilepticus I have seen, lasting 12 days, the boy had severe acetonæmia throughout, due to starvation. He recovered.

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DIVERTICULA OF THE THORACIC ŒSOPHAGUS

REPORT OF A CASE IN WHICH THE DIVERTICULUM WAS SUCCESSFULLY RESECTED

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The first detailed account of diverticulum of the œsophagus was given by Zenker in 1861. The condition had been noted by pathologists before this time, but cases were few and far between, and the diagnosis was never made during life. In 1898, however, the first case to be diagnosed with the aid of an X ray was reported, and since this time the signs and symptoms have been more generally known.

A large number of cases have since been recorded, and from these it has become evident that diverticula occur most commonly in the upper part of the œsophagus,[1] whilst those that occur in the thoracic part are comparatively rare. Indeed Heacock,[2] who reviewed the literature up till 1930, was only able to find records of 85 cases of diverticulum in the thoracic portion. This series did not include cases which had been reported from the post-mortem room, and was not complete, for many more had probably been observed but had not been recorded. It is interesting to note that during the last three years a further 30 cases have been described, and this increase in numbers has been made possible by a more accurate knowledge of the signs and symptoms of the disease and by the routine use of X rays. Large diverticula, however, must still be regarded as extremely rare, and detailed accounts of isolated cases remain of interest.

VARIETIES OF DIVERTICULA

For general purposes it has been found that, in the thoracic part of the œsophagus, diverticula may be conveniently divided into three main types.

1. *Traction diverticula*, which arise most commonly in the vicinity of the bifurcation of the trachea, where lymph nodes and lymphatics are abundant. They are supposed to be caused by contraction of strong bands of fibrous tissue, which pass between the anterior wall of the œsophagus and the epibronchial glands. These bands were described by Ribbert, and it is assumed that chronic inflammation and calcification in the lymph system leads to shortening of the bands and consequent drawing out of small pouches from the gullet. The pouches seldom attain a large size. They are usually associated with tuberculous glands, but a certain number are due to imperfect separation of the trachea and œsophagus and other developmental abnormalities, and these will be found to consist of all the coats of the œsophagus. They tend to open by a wide mouth, and since they are drawn forwards and upwards towards the epibronchial glands or the trachea, food passing down the œsophagus does not accumulate within them. A few of the cases have been associated with other forms of traction, such as adhesions in the vicinity of caries of the spine and pericarditis. Their interest to the clinician is small, but isolated cases have occurred in which a foreign body has lodged in the pouch and caused perforation with subsequent mediastinitis.[3]

2. *Pulsion diverticula* are herniæ of the mucous membrane through the wall of the œsophagus, and they consist of fibrous sacs lined by epithelium and submucosa. They may project from any part of the œsophagus and, when distended with barium, show on an X ray as rounded or oval sacs, which communicate with the lumen by a comparatively narrow opening; for this reason food is particularly liable to collect within them. They are caused by an increased or abnormally directed pressure within the œsophagus itself, acting in a place where there is weakness of the œsophageal wall. This weakness in the wall may be due to areas of congenital defect in the muscular coats—such areas have been demonstrated in embryos—to ulceration of the mucosa, or to the presence of œsophageal cysts which have become continuous with the lumen of the gullet. In the opinion of some, lack of external support of the œsophagus is occasionally to blame. It was thought originally that these cases were always associated with œsophageal obstruction in the form of spasm or organic stricture, but many have been recorded where neither of these conditions was present, and it is well known that, although some diverticula, occurring in association with cardiospasm, have been shown to disappear when the spasm is relieved by treatment, the condition is seldom present in patients with mechanical obstruction, for this latter condition is much more likely to produce a saccular dilatation of the whole œsophagus. The size to which they may attain varies according to the amount of pressure exerted and the time during which it acts; in a few instances the pouch was sufficiently large to hold more than a pint of fluid.

The majority are found in the middle and lower third of the œsophagus, and hang downwards towards the dome of the diaphragm, upon which they may rest; but others have been found in the upper part, and it is suggested that these may be due to a ridge in the mucous membrane, which was described by Lütgert. This ridge lies transversely in the vicinity of the bifurcation of the trachea, and it is conceivable that, if it were unduly prominent, food passing down the œsophagus might be momentarily delayed at this point and so produce a pocket of increased pressure above it.

3. *Traction-pulsion diverticula* are those in which a combination of the above factors are at work, and it is obvious that once a diverticulum has developed, the accumulation of material within it will tend to increase its size.

It will be remembered that, although diverticula of the œsophagus are usually single, many cases of multiple diverticula have been found; some in association with cardiospasm and others with diverticula elsewhere in the intestine. The latter are probably due to a diffuse disturbance of the innervation of the gut, causing irregular and sustained contractions.

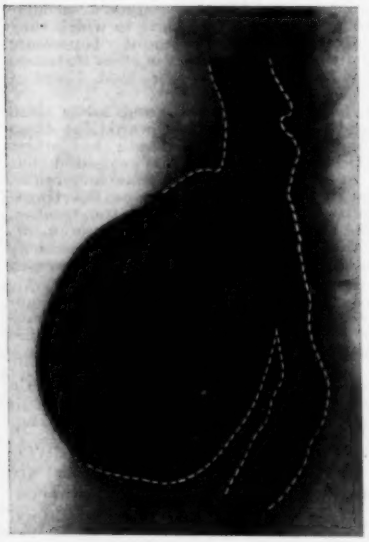
DIAGNOSIS OF DIVERTICULUM OF THE ŒSOPHAGUS

On the whole it is generally agreed that diverticula in the thorax are of little clinical importance, except to the radiologist, in that they seldom give rise to any symptoms, and are usually discovered by chance. In the case of a large diverticulum, however, symptoms occasionally arise.

The initial cause of such a diverticulum is seldom to be found, and the pathology remains obscure. Kraus [4] has reported a case in which at autopsy he found a diverticulum about the size of a large apple opening from the anterolateral aspect of the œsophagus; it had fibrous walls, and was lined by a mucous membrane. Similar cases have since been recorded by Chassard,[5] Dessecker,[6] Billiard and Decoularé-Delafontaine.[7] In spite of these and others, the recorded cases are very few indeed.

It must be remembered that a large diverticulum may exist in a patient who has no signs of symptoms whatever.[7] On the other hand, it may give rise to the signs of increased intrathoracic pressure and the symptoms of obstruction. The commonest complaint of a patient with a large diverticulum which is giving rise to symptoms is difficulty in swallowing and a feeling of fullness in the chest. The characteristic feature of this difficulty in swallowing is that, after pausing for a little time during the taking of a meal, more food can usually be swallowed. The explanation of this is to be found in a study of the diverticulum itself. It lies in the thorax, an inactive sac, which is filled quite passively, and which, when full, overflows into the œsophagus beyond it. Unlike the diverticula found in the neck, it is not usually associated with a stricture in the œsophagus, and is not surrounded on all sides by muscles which resent its enlargement, consequently it is unusual for these patients to complain of vomiting. Regurgitation of food does however occur in some cases, and Smidt has recorded four in which obstruction was eventually almost complete. In

other instances the diverticulum may be sufficiently large to hold the greater part of the meal, and the food will then only pass very gradually into the stomach. Such a patient has been described by Quartero.[9] Other symptoms which have been described in individual cases are an increase in salivation, cardiac pain, dyspnœa, palpitations, and cough. It is worthy of note that some patients have been examined because they complained of vague symptoms of indigestion and abdominal discomfort, and it is possible that a large diverticulum might cause such symptoms by pressure upon the splanchnic nerves.



An X ray photograph of the diverticulum before operation. It shows the relative size and shape of the pouch distended with barium, and the absence of any stricture below the point of communication with the gullet.

Certain diagnosis however is made by means of an X ray picture taken after the patient has swallowed a mixture of barium. This step is essential, not only for the actual diagnosis, but also to localise the position and extent of the diverticulum. The œsophagoscope and bougie have not the same diagnostic importance in this condition as they have in pouches in the cervical region, and it is doubtful if it is necessary to submit the patient to these additional investigations.

The X ray appearances are characteristic but difficulty may occasionally be found in cases where the œsophagus is dilated above an area of spasm or stricture. It must be remembered that a large diverticulum may simulate a diaphragmatic hernia, and Smith [8] states that the two conditions are sometimes associated with each other. Again, obstruction at the lower end of the œsophagus may cause an increase in length, so that it lies coiled upon itself within the thorax; a radiogram of such a condition has recently been shown by Dunhill at a meeting of the Harley Medical Society.

It will thus be seen that in this rare group of diverticula there will be exceedingly few which will ever need any treatment. It is, however, reasonable to submit those patients with large diverticula, who are complaining of symptoms, to surgical treatment, for if left alone there is always the possibility that the diverticulum will increase enormously in size and cause obstruction or perforation into the mediastinum.

SURGICAL CONSIDERATIONS

The removal of a large diverticulum is so seldom undertaken that the standard text-books of operative surgery do not consider the details at all. In recent years however several cases have been successfully treated by various methods of approach.

Lord Moynihan,[10] for instance, tells how Clairmont removed an epiphrenic diverticulum with excellent results, and how other operations for anastomosing the pouch with the fundus of the stomach, as was first suggested by Lotheissen, have been carried out. These methods are applicable only to the epiphrenic variety, since the diverticulum is approached from the abdomen. Quartero, on the other hand, removed the diverticulum which he described by taking out portions of two ribs and approaching it from the back. He found that the sac opened into the œsophagus at the level of the fifth dorsal vertebra, and he was able to remove it without opening the pleural cavity; the patient developed a fistula after ten days, but this soon healed, and six months later the œsophagus was normal in function and appearance.

In view, however, of the fact that the thorax can now be safely opened, it seems reasonable to approach a large diverticulum through the pleural cavity, and the case about to be described shows that this can be accomplished with a good result.

The approach to the posterior mediastinum is best made from the side of the chest, and an artificial pneumothorax done a few days before the operation greatly facilitates the exposure. The position and extent of the diverticulum must be accurately ascertained by X rays taken in two planes, and the level of the skin incision will be determined by this method. An excellent view can usually be obtained without resecting a rib. A positive pressure intratracheal anæsthetic is necessary, and it will be found that the shock of the operation in favourable circumstances is not great. The lung can be expanded by increasing the pressure in the intratracheal tube before the chest is closed.

In the past unfavourable results have been connected with weakness of the suture line in the œsophagus, and it is known that the absence of a peritoneal coat is responsible for this. Many methods have been adopted to prevent the leakage of material from the lumen of the œsophagus into the mediastinum during convalescence, but these have almost always been associated with poor results. There are very few recorded cases in which a portion of the œsophagus has been successfully resected, and this has led surgeons to try various ways of strengthening or supporting the suture line.

Amongst these attempts may be mentioned the continuous use of a positive pressure respiratory apparatus associated with drainage of the mediastinum during convalescence; the mobilisation of the stomach with its peritoneal covering, and its anastomosis to the severed œsophagus (as high as the level of the clavicle, in one case); the use of omental grafts brought from the abdomen and passed through the diaphragm, and, finally, the introduction of irritant substances around the suture line in order to produce local adhesions and dense protective fibrosis. It will be realised that these methods involve additional surgical procedures and increase the risk of an already severe operation, and it is suggested that in the present state of our knowledge it is more reasonable to attack the problem from another aspect—namely, to render the mouth and pharynx as sterile as possible before operation and to reduce the amount of fluid, which may leak out from the lumen of the gullet, to a minimum. Trotter has demonstrated the importance of cleaning up the mouth before operations upon the pharynx, and his arguments can be applied with equal force to the control of sepsis in the mediastinum; as to the reduction of fluids, food, and saliva in the œsophagus, this can be effected by the use of a stomach-tube, through which the patient is fed, and by a protracted course of atropine injections.

It is not suggested that these steps would render an anastomosis of the œsophagus, after the resection of a malignant growth, free from risk; but that, in the case of a diverticulum, where only a lateral incision need be made in the œsophagus, and where the mediastinal lymphatics are not charged with organisms as they are in a malignant growth which has ulcerated, the methods enumerated above are the best at the disposal of the surgeon at the

present time. In this connexion it is interesting to note that the same difficulty has been experienced in cases where an anastomosis has been done in the rectum, after the local removal of a growth, but Grey Turner has shown that sound union can be obtained, even in this situation, if adequate precautions are taken.

Finally it may be mentioned that infection in the pleural cavity is less dangerous than infection in the mediastinum, hence it is customary to approach mediastinal tumours through the pleural cavity rather than from the back. If an empyema should develop during convalescence, this can well be controlled by the usual methods. The power of the pleura to deal with infections is similar to that of the peritoneum, and in the abdomen it is well known that retroperitoneal cellulitis is a more fatal condition than intraperitoneal infection.

CASE RECORD

The patient, sent by Dr. J. B. Christopherson, was a woman of 59, who complained that for two years she had noticed a feeling of fullness in the chest after taking food. The beginning of a meal could be easily swallowed, but almost immediately difficulty occurred and nothing further could be taken for some time. This difficulty was equally apparent in the taking of solids and liquids. After waiting a little time, more food could be swallowed, and the meal was eaten in this way. She very seldom vomited. Her general condition was good, but in the last few months before admission she had noticed a slow but progressive loss of weight. There was no evidence of stricture or cardiospasm.

Physical examination did not reveal any abnormalities, and it was not until an X ray examination of the œsophagus was done that the presence of the diverticulum was discovered. The opaque fluid was seen to fill a large pouch, the neck of which lay at the level of the seventh rib.

Operation.—In view of the progressive nature of the symptoms, it was decided that removal of the diverticulum was necessary, and on July 25th, 1932, an artificial pneumothorax was induced on the right side of the chest and 450 c.cm. of air were introduced. On the following day a further 500 c.cm. of air were added. The operation was carried out on July 27th, intratracheal ether being given as an anæsthetic. A bougie was passed down the œsophagus, and this was felt to lodge in the diverticulum; it was fixed in place as a guide. The skin incision lay along the sixth intercostal space and stretched from behind the mid-axillary line to a point about 2 inches from the edge of the sternum. The intercostal muscles were incised along the upper border of the seventh rib and the pleural cavity was laid open in the same line. An excellent exposure of the thoracic contents was obtained by using rib-spreaders placed at either end of the wound, and the diverticulum could be easily identified by palpating the end of the bougie which lay within it. The parietal pleura over the diverticulum was incised and the latter exposed by blunt dissection. It was very adherent to the surrounding structures and, although no glands could be palpated in the mediastinum, the adhesions were apparently inflammatory in origin.

The diverticulum opened by a wide mouth into the right side of the œsophagus, just above the level where the azygos vein passes forwards to join the vena cava. The azygos vein lay across the front of the neck of the diverticulum, and had to be separated from its surface before the latter could be mobilised. It was found to be 3½ inches in length, and stretched vertically downwards from its neck, so that it lay parallel with the œsophagus. Its walls were thick and fibrous to the touch, and its cavity was lined with mucous membrane. The diverticulum having been clamped with a Parker Kerr clamp was removed with the diathermy knife, and the œsophagus closed with two layers of catgut sutures. A small flap of the parietal pleura was cut to cover the suture line, and the thorax was closed without drainage.

At the conclusion of the operation a rubber tube was passed through the nose to the stomach, and was fixed in position by tapes. Through this tube the patient was fed during the first nine days of convalescence; nothing at all being given by the mouth. The patient suffered somewhat from thirst and dryness in the mouth, but this was treated by repeated painting of the mouth with horse serum and the use of dilute mouth-washes. The secretion of saliva was reduced to a minimum by giving atropine sulphate gr. 1/100 every two hours during the first 12 hours, and after that gr. 1/150 was given four-hourly for 36 hours.

During convalescence the temperature rose to 101° in the evenings of the first three days, but settled well after that. The respiratory-rate was never above 24 to the minute. On the seventh day after operation radiography of the chest showed an opacity at the right base, suggestive of a small collection of fluid and consolidation. A second radiogram taken three weeks after the operation showed that the right side of the chest was perfectly clear.

On discharge from the hospital the patient was fit and well. Swallowing was much improved. Six months after the operation the patient was investigated again. She was free from all discomfort, and a radiogram of the œsophagus showed that there was no abnormality whatever.

My thanks are due to Mr. W. H. C. Romanis, who treated and operated upon this patient, for permission to publish the case, and also to Dr. Geoffrey Fildes, for permission to use the X ray photograph.

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DIVERTICULA OF THE PHARYNX AND ŒSOPHAGUS*

CORRELATION OF PATHOLOGICAL AND RADIOLOGICAL APPEARANCES

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THE occurrence of diverticula in the body is widespread. In the alimentary canal they are frequently seen involving the pharynx, œsophagus, duodenum—usually the second part—and colon. On the other hand, the stomach, biliary and pancreatic ducts are seldom affected. Diverticula are common in the urinary bladder, and they are also found in the ureter and urethra.

Diverticula of the pharynx and œsophagus have received much attention for the past 200 years, commencing with the specimen of pharyngeal pouch described by Ludlow of Bristol in a letter to William Hunter. In spite of this there is probably no subject in surgery in which so many inaccurate observations have been made or so many erroneous theories perpetrated.

* Paper read at the British Institute of Radiology, March 17th, 1933.

In a recent Arris and Gale lecture at the Royal College of Surgeons I discussed the morphological and embryological aspects of the subject. The object of this paper is to correlate the pathological and radiological appearances.

CONGENITAL DIVERTICULA OF THE PHARYNX

Diverticula arising from the pharyngeal embryonic endodermal pouches, or structures associated with them, are lateral in position. There may be a communication with the skin as well as with the pharynx; this is usually found in connexion with a pouch opening immediately below and behind the tonsil. Such conditions lend themselves to radiological examination after the injection of lipiodol. By this means valuable information is obtained regarding the course and connexions of the pouch prior to operative removal.

I have described [1] a congenital pouch of the pharynx derived from the third embryonic endodermal pouch. The pharyngeal opening was very small and situated at the bottom of the left pyriform fossa. On account of the small diameter of the orifice it is unlikely that contrast media would enter the pouch. Diverticula in connexion with the fourth embryonic endodermal pouch are uncommon and the value of radiological examination depends on the diameter of the orifice, which is situated laterally at the lower end of the pharynx.

ACQUIRED DIVERTICULA OF THE PHARYNX

An anterior diverticulum of the acquired variety has been described by Hurst and Briggs,[2] which was discovered by radiological examination lying in the midline immediately in front of the entrance to the œsophagus and posterior to the larynx. Acquired diverticula of the pharynx are usually, however, situated posteriorly, and have been erroneously described as œsophageal. Actually the pouch is a prolapse of the pharyngeal mucous membrane between the two different sets of musculature comprising the cricopharyngeus. This muscle is composed of an upper superficial constrictor portion which is part of the main pharyngeal constrictor musculature, and derives its nerve-supply from the pharyngeal plexus. The rest of the cricopharyngeus is composed of a lower, deeper sphincteric muscle which blends posteriorly with the musculature of the œsophagus, forming a strong sphincter, and is innervated by several small branches from the inner division of the recurrent laryngeal nerve. Herniation of the pharyngeal mucosa occurs between these muscles, which differ from each other in their innervation, physiologically and morphologically.

In the early stage of the development of a pouch of this nature, symptoms are referable to derangement of the sphincteric portion of the cricopharyngeus, and the patient complains of mild dysphagia. This may be present for a long time before a pouch is fully formed. The pathology in this early stage is spasm of the strong sphincter guarding the œsophageal orifice, and consequently the two divisions of the cricopharyngeus become separated, and the pharyngeal mucosa commences to herniate in the interval thus formed. If this stage could be shown by radiological means a valuable contribution would be made to the surgery of the posterior pharyngeal pouch. The further development of the pouch could be arrested by treatment of the spasm of the sphincteric portion of the cricopharyngeus muscle.

When the pouch is fully formed the symptoms are dysphagia, audible gurgling due to the displacement of air contained in the pouch, excessive salivation, and regurgitation of unaltered particles of food. Figs. 1–3 show the radiological appearances of a fully formed pouch giving rise to such symptoms.

At a later stage the large pouch causes marked constriction of the upper end of the œsophagus by direct pressure. There is pronounced dysphagia for solids and liquids, together with marked progressive loss of weight and inanition. The œsophageal orifice is much distorted. Pressure on the recurrent laryngeal nerve causes hoarseness, and there is sometimes ptosis of the eyelid, or exophthalmos due to pressure on the cervical sympathetic. There may be dyspnœa owing to tracheal compression. Pressure on the cervical veins causes congestion of the face. Figs. 4 and 5 show the radiological appearances in this stage.

RADIOLOGICAL EXAMINATION

The best method of examination is by administration of a thick paste of bismuth oxychloride and water of such consistency that it will remain heaped up, as described by Finzi.[3] An outline of the œsophagus remains for some time after the bolus of bismuth has passed. It is essential to notice how the pouch empties; hence fluorescent screening is most important. The best picture is obtained with the patient in the true lateral position (Fig. 3). Other positions are also useful, especially the oblique anterolateral.

The pharyngeal pouch casts a dark shadow which is distinct from the outline of the œsophagus and has a lower rounded border. On the fluorescent screen the pouch is seen to fill, and when it is full the bismuth overflows from the upper aspect into the œsophagus. In cases where the pouch presses on the œsophagus, bismuth is held up at the site of the stricture.

It is necessary to distinguish a pharyngeal pouch from a carcinomatous stricture of the upper end of the œsophagus. Fig. 6 shows the radiological appearances of such a stricture. It shows dilatation of the œsophagus proximal to the stricture; the lower border of this dilatation is conical, and is followed by marked irregularity of the œsophageal lumen. On screening, the bismuth is seen to flow out of the lower end of the dilated portion of the œsophagus. On the other hand, bismuth flows from the upper part of a pharyngeal pouch, and the lower border of the pouch is round and not conical; moreover, irregularity of the œsophageal lumen is not present.

In certain cases the radiological appearances of a pharyngeal pouch simulate those of a neoplasm, and there have also been cases of carcinoma developing in posterior pharyngeal pouches. The latest example is one reported by Capps and Dunhill.[4] The patient was a man aged 59, who had suffered from dysphagia for 30 years, and the onset of malignancy was marked by hæmorrhage. Radiological examination of such cases shows a filling defect in the pouch with well-marked irregularity of the wall. It is interesting to speculate why squamous-celled carcinoma attacks these pouches. We know that chronic irritation is an important ætiological factor in the development of carcinoma in other organs, and it is possible that long-continued chemical irritation from the stagnating contents of these pouches may lead to malignant changes.

DIVERTICULA OF THE ŒSOPHAGUS

Numerous varieties of diverticula occur in the œsophagus which are unrelated in their pathogenesis. I wish to call attention to the varieties which are of importance from the radiological aspect.

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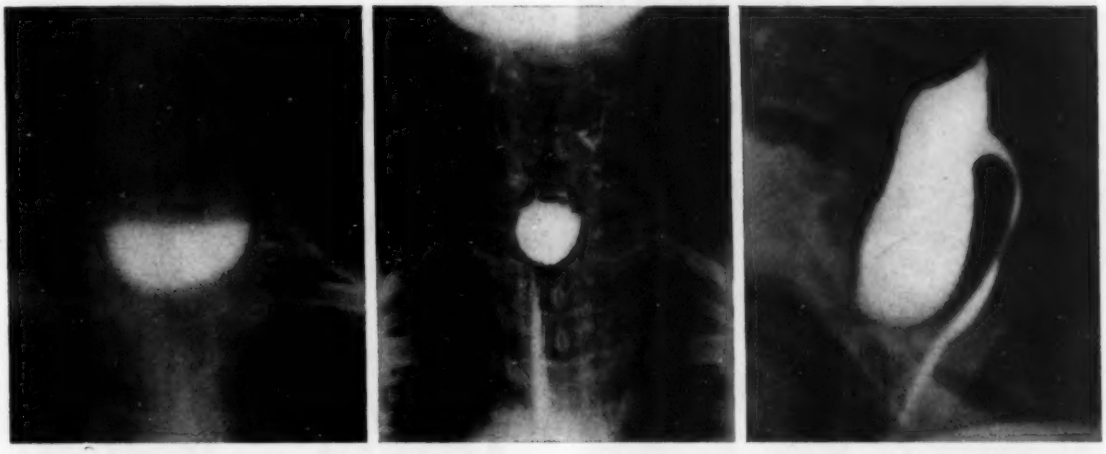

FIGS. 1 TO 3.—Posterior pharyngeal diverticula seen in the anterior, posterior, and lateral positions respectively.

In *congenital pouch associated with an œsophago-tracheal fistula*, the pathological picture is very constant. The œsophagus commences in the usual way and ends blindly, forming a uniformly dilated pouch. The lower segment of the œsophagus opens into the trachea at the bifurcation or a short distance above. On radiological examination a large amount of gas is seen in the stomach, and on swallowing bariumised milk a picture corresponding to the condition is obtained. Post mortem a very good picture can be obtained, if a thin emulsion of bismuth is injected into the larynx under pressure. Fig. 7 shows the filled pouch, and the bismuth has flowed into the larynx, trachea and has filled the bronchial tree, and has passed through the fistulous opening from the trachea into the œsophagus. A similar injection can be made through a gastrostomy and the œsophagus, bronchial tree, and trachea are filled from below.

The lower portion of the œsophagus may be absent, and in these cases the trachea opens into the upper blind œsophageal pouch. In other cases, the middle part of the œsophagus is absent, the upper and lower portions forming blind pouches (Fig. 8). The recognition by radiological methods of the variety of abnormality present is important when the question of surgical treatment is considered. In patients with demonstrable œsophagotracheal fistulæ it may be possible to perform gastrostomy, and when the child is older and stronger reconstruction of the œsophagus and trachea may be attempted.

Tuberculous pouch.—This term, introduced by Kragh,[5] is preferable to the term traction diverticulum. It is an unfortunate fact that nearly all pouches of the œsophagus have been described as either traction or traction pulsion, irrespective of their true nature. Other varieties of pouch occur which have no connexion with tuberculous lymphadenitis, nor are they due to increased intra-œsophageal pressure.

Tuberculous pouches are commonest in the anterior wall of the œsophagus immediately below the bifurcation of the trachea. They are small, of conical shape, with an oval orifice, and the long axis of the

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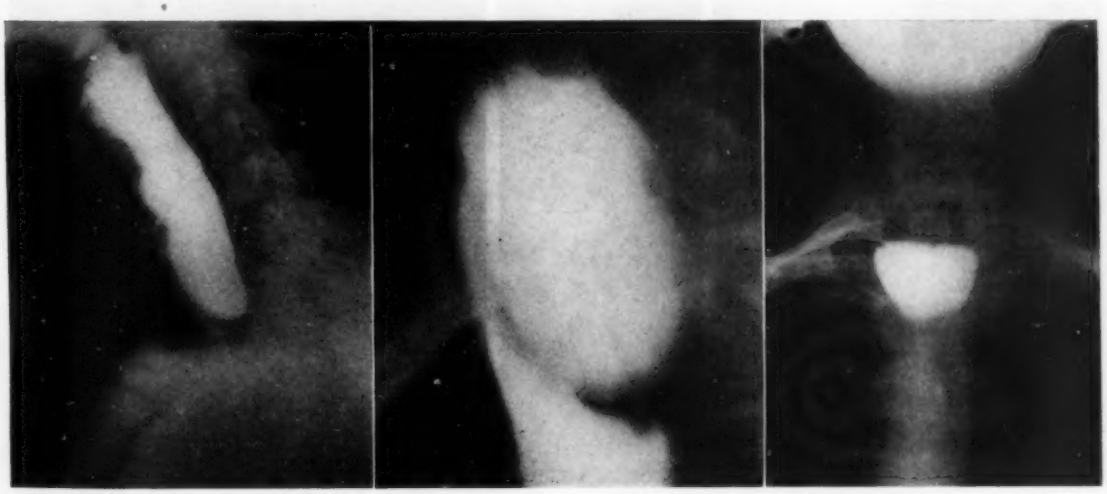

FIGS. 4 AND 5.—Large posterior pharyngeal diverticula seen in the lateral position causing pressure on the œsophagus.
FIG. 6.—Carcinomatous stricture at the upper end of the œsophagus simulating a posterior acquired diverticulum of the pharynx.

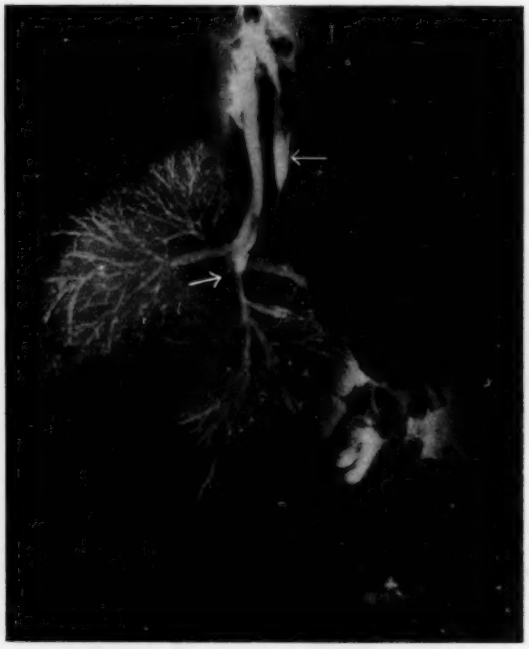

FIG. 7.—Injection of bismuth paste post mortem into larynx under pressure. Upper arrow indicates œsophageal pouch; lower arrow œsophago-tracheal fistula.

FIG. 9.—Œsophageal pouch situated in the anterior wall immediately below the bifurcation of the trachea caused by tuberculous lymphadenitis. (Drawing from specimen in museum of St. Bartholomew's Hospital.)

pouch is either obliquely upward or downward. The appearances are shown in Fig. 9. Radiologically they are seen as barium-filled sacs in the anterior wall of the œsophagus in its middle-third. The long axis is obliquely downward (if upward contrast media does not enter and they are not seen). The wall often shows much irregularity. They may be single or multiple. The radiological appearances are seen in Fig. 10.

Diverticula associated with obstruction at the lower end of the œsophagus.—Dessecker [6] believes that a history of cardiospasm can, as a rule, be elicited in cases with diverticula in the lower-third of the œsophagus. In the majority of cases of cardiospasm dilatation of the entire œsophagus is more commonly seen than pouch formation. Fig. 11 shows an epiphrenal diverticulum of the œsophagus. This diverticulum developed within four months; a previous radiological examination revealed no abnormality of the œsophagus. The appearances seen at the lower end of the œsophagus suggested that the pouch was secondary to cardiospasm.

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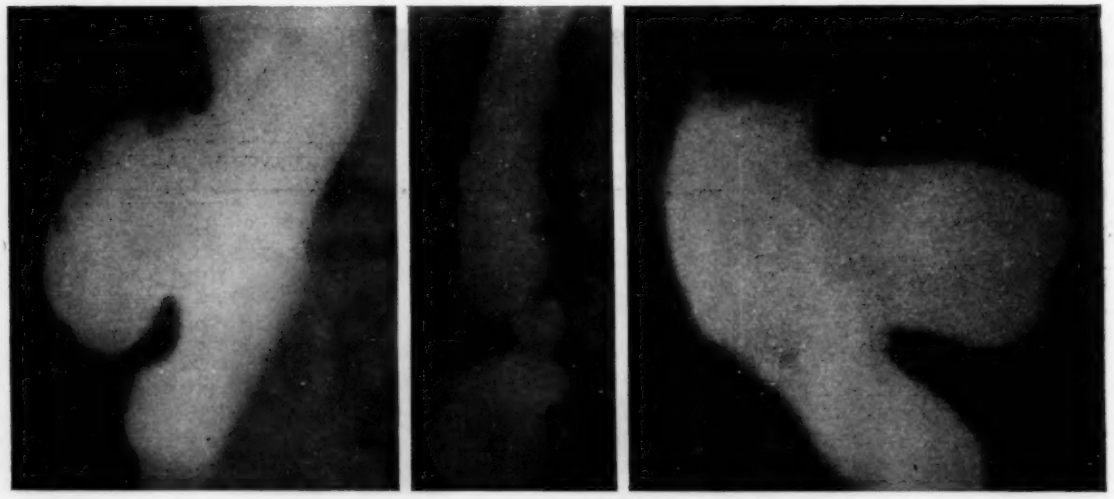

FIG. 10.—Appearances seen in œsophageal diverticulum of the tuberculous variety.
FIG. 11.—Epiphrenal diverticulum. FIG. 12.—Large œsophageal diverticulum.

Cases of organic stricture may be innocent or malignant. The œsophagus proximal to the stricture may uniformly dilate throughout a certain segment, forming a fusiform pouch. In other cases the increased œsophageal pressure causes divarication of the muscle bundles with herniation of the mucous membrane, forming a saccular pouch.

Large œsophageal pouches.—It is difficult to decide on radiological grounds the nature of these large pouches. The most reasonable supposition is the presence of distal œsophageal obstruction raising the intra-œsophageal pressure, which causes herniation of the mucosa in an area where the muscle coats have been weakened by local œsophagitis. The radiological appearance of these large œsophageal pouches is shown in Fig. 12.

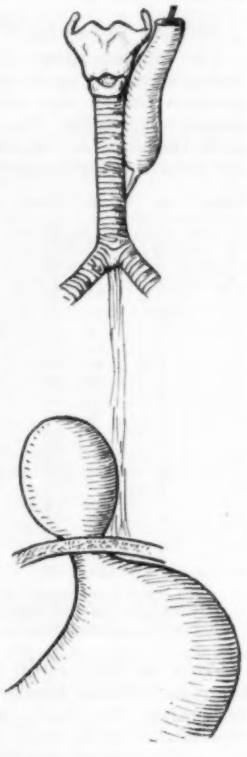

FIG. 8.—The middle portion of the œsophagus is absent. The two extremities of the œsophagus form blind pouches. A fibrous cord connects the upper pouch with the trachea. (Drawing from specimen in museum of Royal College of Surgeons.)

I am indebted to the directors of the medical and surgical professorial units at St. Bartholomew's Hospital and to Mr. F. C. W. Capps for permission to study and reproduce X rays of patients under their care, and to Dr. N. S. Finzi and Dr. J. V. Sparks for X ray plates, and to Dr. G. Simon for help in the preparation of Fig. 7.

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THE ELEMENTARY BODIES OF VARICELLA

AND THEIR AGGLUTINATION IN PURE SUSPENSION BY THE SERUM OF CHICKEN-POX PATIENTS

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Many years ago Aragão (1911) reported the finding of minute coccoid bodies, which he believed to be living micro-organisms, in the lesions of varicella. Later Paschen (1919) independently discovered that the vesicle fluid of chicken-pox contained large numbers of elementary bodies resembling those which he had described in vaccinia in 1906, and suggested that they might be the actual infective agents. Quite recently Taniguchi (1932) and his associates have described similar bodies in varicella vesicle fluid, and also in the lesions produced by inoculation of the rabbit cornea with the contents of such vesicles.

The examination of a large number of specimens of varicella vesicle fluid at the Lister Institute has yielded ample confirmatory evidence that these bodies are constantly present in the early stages of the eruption. It was therefore determined to apply to this virus some of the new methods of research which have recently proved so valuable in vaccinia and variola.

In the case of vaccinia it has been shown by Eagles and Ledingham (1932) that the deposit obtained by high speed centrifugalisation of Berkefeld filtrates of the virus consists entirely of elementary bodies, and that this deposit is highly infective, whereas the supernatant is completely depleted of virus. It has further been shown by Ledingham (1931) that pure suspensions of vaccinia elementary bodies are agglutinated specifically by antivaccinial sera. This work has since been confirmed by Craigie (1932), and by the writer (Amies, 1932) who has also shown that pure suspensions of the elementary bodies of variola are specifically agglutinated by the serum of small-pox patients. The presence of elementary bodies in tissue cultures has been demonstrated by Nauck and Paschen (1932), and Eagles and Ledingham were able to demonstrate them in cultures grown in a cell-free medium.

The application of the above methods to the study of varicella is rendered difficult by the fact that this virus has not been adapted to the skin of the usual laboratory animals. Taniguchi (1932) claims to have produced a dermal strain by inoculating rabbits intratesticularly with vesicle fluid, and later applying this testicular strain to rabbit skin. In this work, however, the possibility of accidental contamination with Virus III. was not excluded, and in my hands the method has so far proved disappointing. Human varicella vesicle fluid is therefore at present the only source from which the elementary bodies can be obtained.

The lack of a suitable test animal also made it impossible to carry out infection experiments with centrifugalised virus filtrates. There remained, however, the possibility of demonstrating an agglutination reaction between a pure suspension of the bodies and the serum of patients during and after recovery from varicella. Such a reaction has now been demonstrated. A description of the technique employed and the results obtained are given below.

EXPERIMENTAL METHODS

The preparation of stained films of elementary bodies. Since the examination of stained films plays such an important part in investigations of this nature, a brief description will first be given of two staining methods which are simple and give very satisfactory results.

Thin films of vesicle fluid or elementary body suspension are made on perfectly clean slides and allowed to dry in the air. The slides are then immersed in normal saline solution for ten minutes and then in distilled water for a similar length of time. The films are dried and next fixed in methyl-alcohol for five to ten minutes. The alcohol is removed with distilled water and again dried in the air.

The slides are now treated with Zettnow's mordant, the formula of which is: tannic acid (pure), 1·0 g.; distilled water at a temperature of 60° C., 20·0 c.cm.; aqueous tartar emetic (5 per cent.), 3·0 c.cm. (added slowly). The slides are completely flooded with this mordant and heated on a hot plate until steam arises for ten minutes. Care must be

taken to prevent this solution from drying at the edges of the slide. The slides are next thoroughly flushed with distilled water, great care being taken to remove any white deposit at the edges. The films are then stained with Ziehl-Neelsen's carbolfuchsin until steam rises for two minutes, thoroughly washed with distilled water, dried, and examined.

Alternatively, the following mordant may be used: potassium alum, saturated aqueous solution, 5·0 c.cm.; tannic acid, 20 per cent. aqueous solution, 2·0 c.cm.; and mercuric chloride, saturated aqueous solution, 2·0 c.cm. This mordant is the same as that recommended by Gray (1926) for staining flagella, except that basic fuchsin is omitted from the formula. It should be freshly prepared every few weeks. The slides are covered with this solution, and heated on a hot plate until steam rises for 90 seconds. After thoroughly washing off the mordant, the slides are dried in the air and then stained as before with carbolfuchsin.

Preparation of varicella elementary body suspensions. Varicella vesicle fluid rapidly clots when it is removed from the body. For this reason it is necessary to harvest it directly into a small volume (0·5 c.cm.) of normal saline containing 2·0 per cent. of sodium citrate. This is conveniently contained in a sealed 1·0 c.cm. ampoule, which can be opened at the bedside and resealed in a gas flame before returning to the laboratory. A fine capillary pipette fitted with a rubber teat is used to puncture the vesicle and to transfer the fluid to the diluent. If the fluid on aspiration is found to be cloudy from the presence of inflammatory cells it should be discarded, for experience has shown that the elementary body content of such fluid is low, while the disintegrating cells considerably increase the work of obtaining a pure suspension. Cases of chicken-pox with a profuse vesicular eruption are rare; but the contents of 20 vesicles will yield sufficient pure suspension for five or six agglutination tests.

The citrate-saline suspension is first centrifuged at a relatively slow speed (1500–2000 revolutions per minute) for ten minutes in order to throw down any gross debris, cells, &c. The supernatant fluid is then transferred to Pyrex tubes of about 5 mm. internal diameter, with a constriction at the top end to enable them to be plugged with wool while they are being centrifuged. In these tubes the fluid is centrifuged in a high speed centrifuge (manufactured by Baskerville and Lindsay, Manchester) at a speed of 10,000–12,000 r.p.m. for 30 minutes. After centrifugalisation the supernatant fluid is removed, and the deposit containing the elementary bodies is resuspended in normal saline containing 0·25 per cent. of formalin. After a further short period of centrifugalisation to deposit any debris which may still be present, the suspension is ready for use

A pure elementary body suspension has an opalescent appearance which is markedly different from the opacity produced by dispersed bacteria. For this reason Brown's tubes are useless for standardisation, and the only method at present available is by visual comparison with another suspension arbitrarily adopted as a standard. Each batch of antigen is tested before use with an antiserum of known agglutinating power.

The actual test is carried out by mixing on a coverslip equal volumes of the antigen and an appropriate dilution of the serum which is to be examined. The mixture of antigen and serum is then mounted as a hanging-drop preparation in a vaselinised chamber. The aluminium ring type of moist chamber is employed. The preparations are kept at room temperature and are examined under the microscope after 24 and 48 hours, using a two-thirds inch objective and a × 10 ocular. A positive reaction is recognised by the appearance of small, highly refractile clumps, exactly resembling those produced in the vaccinia agglutination reaction. Examination of preparations suitably fixed and stained shows that these clumps consist entirely of elementary bodies.

Repeated tests have shown that normal sera from man, monkey, or rabbit do not agglutinate these suspensions. Antiserum obtained from animals hyperimmunised against vaccinia, and known to contain antivaccinial agglutinins to a high titre, has also consistently failed to agglutinate these suspensions of varicella bodies.

RESULTS OBTAINED WITH CONVALESCENT SERUM

The agglutination test as described above has been carried out on 61 sera obtained from 55 different patients during and after recovery from a typical attack of varicella. The results of these tests, together with the time at which each specimen was taken, are shown in the accompanying Table.

Case.	A	B	Case.	A	B	Case.	A	B
1	2	N	16	8	64	37	17	N
2	3	N	17	9	128	38	17	4
3	4	N	18	9	32	39	17	8
4	4	N	19	9	64	40	18	N
5	5	64	20	9	N	41	18	128
	10	256	21	10	32	42	18	128
6	5	8	22	10	32	43	18	128
7	5	16	23	10	128	44	20	N
8	5	16	24	10	64	45	20	32
9	5	64	25	11	128	46	23	N
10	5	N	26	12	128	47	23	16
	12	N	27	12	64	48	24	N
	19	N	28	12	32	49	25	128
11	6	32	29	12	N	50	34	N
	22	64	30	12	32	51	60	32
12	6	4	31	12	N	52	60	64
	6	64	32	13	N	53	70	64
13	13	128	33	13	128	54	90	N
	20	128	34	14	N	55	120	N
14	7	64	35	15	N			
15	7	128	36	17	N			

A = Days from onset of eruption.
B = Agglutination titre (end-point).
N = No agglutination in dilution of 1 in 4, or higher.

From the data given in this Table it will be seen that agglutinins appear in the blood about five days after the onset of the eruption, and persist therein for some time. In a few cases, however, the agglutination reaction has failed to detect the presence of circulating antibodies even when, as in Case 10, a number of tests were made at different times during the convalescent period. This failure to show a reaction is quite in accordance with what is already known regarding the protective power of convalescent serum in virus infections. In poliomyelitis and measles, for example, it is well known that wide variations occur in the antibody content of the convalescent serum; and the same has been found in the case of animals experimentally infected with vaccinia.

Some valuable work has recently been done by Gunn (1932) on the value of convalescent varicella serum as a prophylactic. The results obtained in a series of carefully controlled experiments indicated that pooled varicella serum had a definite protective value, but that in the doses employed it was inferior to convalescent measles serum as a prophylactic agent in measles. From unpublished data kindly supplied to me by Dr. Gunn it appears that variations in the potency of different batches of serum were noted. In future it may be possible by means of the agglutination reaction to detect those sera which have a high antibody content. Sera of known potency could then be used in place of a pooled serum in which the active ones are diluted by the addition of those which have little or no protective value.

SUMMARY

(1) The findings of Aragao and of Paschen, that elementary bodies are present in the vesicle fluid of varicella, have been amply confirmed. (2) A method of preparing purified suspensions of these

bodies is described. (3) Such suspensions are specifically agglutinated by the serum of patients convalescent from varicella. The results obtained in a series of 61 agglutination tests are recorded. (4) The constant presence of elementary bodies in the early vesicle fluid, and the fact that they are specifically agglutinated by the homologous antiserum, are regarded as strong evidence in favour of the view that these represent the actual infecting agents of varicella.

All the patients examined in this investigation were under treatment at various fever hospitals of the public health department, London County Council. For permission to use this clinical material I am greatly indebted to Dr. J. A. H. Brincker, principal medical officer, public health department, and to the medical superintendents of the fever hospitals. My thanks are also due to Dr. W. Gunn, deputy medical superintendent of the North-Eastern Hospital, and to Dr. L. J. M. Laurent, senior medical officer of the Western Hospital, who have rendered me invaluable assistance throughout the investigation.

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Clinical and Laboratory Notes

CARCINOMA OF THE ASCENDING COLON IN A BOY AGED SIXTEEN

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CASES of carcinoma of the intestinal tract occurring in young individuals must be looked upon as extremely uncommon, and it is because of this and because a very complete post-mortem examination was carried out, that I have considered the following case worthy of recording.

CLINICAL RECORD

History.—A. B., age 16, was admitted to King's College Hospital on Sept. 30th, 1931, complaining of pain in the abdomen which had been present for five weeks. For three weeks previous to admission the patient had vomited every day, and the act of vomiting helped to relieve the pain. There was no history of hæmatemesis, and the bowels had acted normally until three weeks before admission. The pain in the abdomen was situated mostly on the right side, and this pain was more or less constant and had no relation to the taking of food. The patient noticed that he had lost almost a stone in weight during the year before his pain began.

On examination the boy was definitely emaciated. There was very active peristalsis to be seen and a large swelling situated in the right iliac fossa. On palpation there was a definite hard mass which could be palpated in the right side of the abdomen, the upper part of which disappeared under the right costal margin. The rest of the abdomen appeared normal, but there was very definite distension of the small intestine. Rectal examination was negative. The boy appeared to be suffering from a secondary anæmia, and his red blood corpuscles were under 3,000,000 per c.mm. The blood was found to belong to group 4.

On Oct. 2nd *laparotomy* was performed through a right paramedian incision. A large hard fixed carcinomatous mass was found in the ascending colon. There were a few secondary deposits in the liver, mainly situated on its inferior surface, and a mass of glands to the right of the aorta. An ileo-transverse colostomy was performed uniting the terminal ileum to the middle of the transverse colon. This was not an easy procedure because of the distension of the small intestine. However, the final row of sutures was reinforced by an omental graft. The abdomen was closed without drainage. The wound healed by first intention and the patient immediately began to improve and put on weight, and was discharged on Oct. 16th.

The patient was *readmitted* to hospital on March 4th, 1932, because of abdominal pain, when it was found that emaciation was extreme and there was an enormous hard mass to be felt occupying almost the whole of the right side of the abdomen. He required large doses of morphia to relieve the pain and died on March 14th. An autopsy was performed and an enormous carcinoma of the ascending colon was found with diffuse carcinomatosis all over the abdominal peritoneum, and the following is a report of the post-mortem findings.

EXTENT OF THE GROWTH

After the whole of the abdominal contents had been removed they were placed in formalin solution so that a complete investigation could be made. The specimen consists of the abdominal viscera, diaphragm, crura of the diaphragm with part of the posterior abdominal wall, the thoracic aorta, and a portion of lungs.

There is a central mass of growth fusing the hepatic flexure, ascending colon, and right half of transverse colon and great omentum, the duodenum and inferior border of the pyloric end of the stomach, the root of the mesentery, and the posterior abdominal wall into one solid mass. Besides the duodenum and colon, the mass is traversed by inferior vena cava, the aorta and common iliac arteries, the portal vein, the bile-duct, and hepatic artery, all of which are entirely surrounded. The pancreas appears to be entirely replaced by growth and there are many secondary nodules in the mesentery.

The ileum, 4 in. from the ileocæcal valve, had been anastomosed to the transverse colon, 6 in. to the left of the hepatic flexure. The right kidney is surrounded by the growth on the inferior and medial borders but is not invaded; the suprarenal capsules on both sides are embedded in the growth but are not invaded. The right half of the diaphragm is replaced by growth, which appears on the pleural surface. The left half and pericardial portion are covered by growth on the under surface. The crura of the diaphragm and both psoas muscles are invaded superficially. The growth extends into the posterior mediastinum by a mass of secondary deposits which have coalesced and surrounded the thoracic aorta.

The aorta, inferior vena cava, and portal veins are much compressed by the growth, but are not invaded by it. The duodenum is greatly compressed by the growth, the lumen being almost occluded. From the anastomosis to the root of the mesentery there is a wedge-shaped mass of growth.

On dissection the anastomosis is found to be completely occluded by growth which has spread along the colon to about two inches to the left of the anastomosis in the submucosa. The growth has also extended into the ileum at the site of the anastomosis, and extends about half an inch into the ileum on either side. The original growth is an annular carcinoma of the ascending colon 1 in. below the hepatic flexure. There is a circular band of ulceration about half an inch broad at this point where the muscular coat is completely replaced by growth. The growth extends to the cæco-colic junction in the submucosa, but the muscular coat, though invaded by growth, survives as it does also in the transverse colon. The duodenum is almost completely occluded; here also the submucosa is invaded and greatly thickened, but the muscular coat is fairly well preserved. The stomach shows the same condition, the submucosa invaded over the adherent inferior border and extending upward about one inch, with no ulceration of the mucosa.

The lungs showed extensive peribronchial secondary deposits throughout the lower lobes on section, the lung tissue otherwise being normal. The pleura of the right lung was studded with deposits of growth over the lower lobe, but the left lung showed such deposits all over the surface. The bifurcation and hilæ glands are heavily infiltrated with growth.

The posterior mediastinal glands are replaced by growth and surround the thoracic aorta.

At post-mortem the liver showed nodules of growth along the falciform ligament. The peritoneal surface showed a number of secondary nodules, as did also that of the gall-bladder. There were, however, no deposits in the substance of the liver. No invasion of the kidneys had occurred, though the right kidney was partially surrounded by growth which was adherent to the capsule. The spleen showed no invasion, but the pedicle was surrounded by the growth. The heart and pericardium were normal.

CHARACTER OF THE GROWTH

On section the lower border of the stomach, adherent to the main mass of growth, is seen to be heavily invaded

by a colloid type of carcinoma with a great deal of degeneration. The extra muscular area shows much fibrosis tissue infiltrated with the carcinomatous tissue, the muscular layer is fairly heavily infiltrated, but the growth in the submucosa has extended nearly to the surface, and there is little or no fibrous tissue formation. The muscular wall in spite of this infiltration is fairly well preserved and is hypertrophied in places.

In the mass of growth between the stomach and transverse colon remnants of the pancreas are to be seen, and the pancreatic duct is embedded in the growth.

The carcinoma cells are uniform in type throughout. There is no attempt at acinus formation. Mucoid degeneration is complete in the centre of many of the larger areas, the surrounding cells being of the signet ring type. In other less extensive areas signet ring forms only are seen. The younger cells are of a spheroidal type. The central mass of growth shows predominantly masses of fibrous tissue, with spheroidal cells in the chinks between. Colloid formation is sparsely represented in this central mass.

A section of the transverse colon in the right half shows the invasion to be predominantly subserous. Much fibrous tissue formation has occurred. The muscular coat is fairly well preserved. In the submucosa there are masses of growth, chiefly of the degenerating signet ring type of cell, but some fibrous tissue formation has occurred. Some small masses show a very definite round-celled infiltration around them. No ulceration has occurred. In the ascending colon a section taken from the lower edge of the growth shows the advancing growth to be chiefly subserous, though submucous deposits are seen and there is some invasion of the muscular coat.

The duodenum on section shows a very marked hypertrophy of the muscular coats, particularly the longitudinal. The surrounding growth is chiefly of the cellular and colloid type and not much fibrosis has occurred. The submucosa is not much affected, though there are areas of infiltration of the submucous and muscular coats.

The bronchi on section show the surrounding infiltration of the same type of degenerate colloid carcinoma, as do also the mediastinal glands.

During the ten years 1920–29 inclusive there were 322 cases of carcinoma of the colon, excluding the rectum, admitted to King's College Hospital, and the average age of the patients was 52. Chajutin [1] has reported a case of carcinoma of the cæcum in a girl aged 14 years; the majority of cases, however, occur from the fifth decade onwards. In 100 cases of carcinoma of the cæcum collected from the Mayo Clinic by Craig and MacCarty [2] the average age-incidence was 49; while in 25 cases operated upon by myself [3] the average age-incidence was 58. These figures are referred to as there is no collection of cases of carcinoma of the ascending colon from which an average age-incidence can be obtained.

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CONGENITAL AORTIC BICUSPID VALVES ASSOCIATED WITH FENESTRATION AND GROSS MENTAL DEFICIENCY

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A BICUSPID condition of the aortic valve is not in itself a very uncommon finding. Lewis and Grant [1] have collected 116 cases from the literature, and they considered 33 to be definitely, and many of the remainder probably, of congenital origin. Wauchope [2] has described 52 cases, considered to be congenital out of 9966 London Hospital autopsies. The two cases reported here are of particular interest in that (1) they occurred in low-grade mental defectives who showed physical as well as mental signs of congenital defect; (2) a fenestrated condition of the aortic or pulmonary valve was the only other cardiac abnormality; and (3) in one case sudden death occurred apparently due to the rupture of the fenestrated cusp.

CASE 1.—Male, 3 years and 4 months old. Second of two siblings; elder brother died at age of 6 months from enteritis. No noteworthy family history. Patient was a low-grade imbecile, in whom deficiency was noted from birth.

Examination.—Right hemiparesis with slight spasticity of both legs. Double positive Babinski sign; tendon reflexes exaggerated on right side; no knee- or ankle-clonus;

Photograph showing the strip of tissue (T) between the fenestrations, ruptured at R.

abdominal reflexes present. Almost blind, owing to double congenital cataract. (Both eyes needled twice at Moorfields in first year of life.) Irregular, eccentric pupils, right larger than left. Light reaction present only in right eye. Coarse nystagmus. Well-defined epicanthus. No clinical evidence of cardiac abnormality. No history of rheumatic infection.

The patient, who was always weakly and querulous, woke up crying during the night of Sept. 2nd, 1932. He settled down after about an hour, but died quietly a little later. No unusual circumstances were present.

Post-mortem findings.—The brain was small and rounded. Weight 21 oz. Convolutions of normal pattern, but somewhat flattened. Left lateral ventricle dilated, especially in posterior horn. Left parieto-occipital cortex narrow, cell lamination disorganised, some proliferation of glial tissue. Left frontal and motor areas showed diminution in number of nerve-cells and some neuronic degeneration in lower layers. Cell lamination fairly well maintained. The heart was small and pale. Weight 1½ oz. Gross deformity of aortic valve. The right and left coronary cusps were fused. The line of fusion showed considerable thickening, and was partially attached to the aortic wall. Each component half of the fused cusp presented a fenestration. Between the fenestrations (see Figure) was a strip of tissue (T), which had originally constituted the marginal portion of the line of fusion of the cusps, but which had undergone a recent rupture (R). There were no other cardiac abnormalities. Microscopy showed no signs of inflammatory fusion. Other organs showed no pathological signs.

CASE 2.—Male, 3 years and 5 months old. Second of three siblings; elder brother (8 years) said to be normal; sister only a few weeks old. Maternal uncle at Rampton State Institution (deaf mute). No other family history of note.

Patient was a low-grade mongolian imbecile, with small rounded head, characteristic facies, epicanthus, fissured tongue, short, square hands and feet, and typical mental characteristics. No clinical evidence of cardiac abnormality

No history of rheumatic infection. Death occurred on Nov. 5th, 1932, from broncho-pneumonia.

Post-mortem findings.—Brain: typical mongol appearances. Lungs: extensive broncho-pneumonia of both lungs, only the apices escaping. Liver: slightly "nutmeg." Heart: weight 2½ oz. Excess of pericardial fluid. The aortic valve consisted of two cusps of almost equal size. From the relations of the cusps to the coronary arteries it would appear that the slightly larger cusp was formed from the fusion of the right coronary and the intercoronary cusps. No line of fusion was visible. The pulmonary valve showed a small fenestration of one cusp. Other organs showed no pathological signs.

Bicuspid aortic valves may be due to one of three causes: congenital abnormality, secondary fusion owing to postnatal endocarditis, or possibly secondary fusion owing to fœtal endocarditis. The last theory, however, has little support, and has generally been discarded. The most important points in diagnosing a congenital origin are defined by Lewis and Grant as: presence of other cardiac abnormalities; age of subject (under 5 years may be considered congenital); microscopic architecture of affected cusp; absence of line of fusion. These criteria of congenital origin were present in both the above cases, Case 1 fulfilling the first three conditions and Case 2 the first, second, and fourth. In addition, both cases presented mental and physical abnormalities of development (other than cardiac), Case 1 showing cerebral anomalies and congenital cataract, and Case 2 mongolism. The type of fusion differed considerably in the two cases, Case 1 showing every evidence of secondary, although not inflammatory, fusion, while in Case 2 there were no naked-eye signs of subdivision, a much rarer finding even in definitely congenital cases.

The coexistence of bicuspid valves and mental deficiency might reasonably be expected, for the occurrence of almost every congenital malformation has been noted in cases of amentia. Nevertheless, we have been unable to find any record of this association, unless the case of a hydrocephalic eight months' fœtus [3] be taken as a potential imbecile. Fenestration appears to be a fairly rare accompaniment, although Wauchope [2] describes three cases involving the aortic cusps. Previous descriptions of the fenestration of a pulmonary cusp, as found in Case 2, has not come to our knowledge.

The cause of death in Case 1 remains a matter for speculation. Rupture of a fenestration rarely causes sudden death, because the fenestrated portion is usually nearer the free margin of the valve than the line of contact of the cusps when the valve is closed. For this reason the rupture does not usually affect the functional activity of the valve. In this case, however, the rupture of the median raphé between the fenestrations caused an unusually large aperture, and the extreme deformity of the valve made it difficult to demonstrate the functional limit of the cusp. In the absence of any other apparent cause of death, it seems probable that the rupture was in this instance the responsible agent.

We should like to thank Dr. James Nicoll, medical superintendent of the Fountain Hospital, for permission to publish the cases, and Mr. J. E. Stevens for the photograph.

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MEDICAL SOCIETIES

MEDICAL SOCIETY OF LONDON

AT a meeting of this society held on May 8th the chair was taken by the president, Sir JOHN BROADBENT, and the annual oration was delivered by Lord HORDER, who took as his subject

New Remedies for Old

He emphasised the importance of seeing both pathology and therapeutics steadily and whole. A good doctor, whatever his specialty, must (he said) in spirit be physician, surgeon, psychologist, and immunologist. He must think both physiologically and pathologically. There was no serious doubt about the progress made by medicine during the last few decades. The dreary lives and outlook of thousands of sufferers from diabetes and pernicious anæmia, for instance, had been completely changed by the discovery of insulin and liver therapy. The application of technique to therapeutics had led to many sound methods, and the fusion of the efforts of the surgeon with those of the physician were to be seen in more than one field—for example, artificial pneumothorax and phrenic evulsion. In physiotherapy there was more and more evidence that the man controlled the method rather than the method the man. Most treatments were matters of expediency and not of right or wrong; it was always Nature that worked the cure. The disharmony which was called disease could only be resolved by the operation of processes already inherent in the body. To tamper unduly with the fundamental studies in the student's curriculum would lead to an extension of an already disastrous tendency in modern therapeutics: the tendency to think that "direct action" was the best way of getting a sick person restored to health. Some diseases certainly called for direct action, but they were for the most part accidents rather than true disease processes; for example, poisoning and foreign bodies. Even the diagnosis of an inflammation in the "acute abdomen" did not necessarily indicate direct action. Direct action was the main appeal of quack medicine to the credulous public. "Purple pellets for pallid persons," in addition to the attraction of alliteration, stressed the appositeness of the remedy for the particular purpose. The empirics did not monopolise this form of appeal. Other names offended because they put the doctor's mentality on a level with that of a layman and suggested that a number of widely different disease processes were all amenable to the same chemical substance. The doctor-turned-chemist did not help in these matters; there was trouble enough in resisting the blandishments of the chemist proper. Formerly the chemist was the servant of the doctor; to-day he tended to become his master.

MASS ATTACK

There was a tendency in the direction of mass attack by drugs. This had proved useful in some cases but not in all. Salicylates, quinine, alkalis, iron, iodine, and digitalis were all given to-day in very much larger doses than had been customary in the last century. The result of "digitalisation" was that the drug was much less used in minor circulatory conditions where it had formerly been given with advantage, and in which smaller doses were very effective. Thoroughness in treatment, Lord Horder said, always made a great appeal to him. The dogged persistence of a disease process, once started, was one of the lessons that experience alone

taught. Remissions—yes; quiescence—yes; but arrest—possibly yes, but probably no. Better in any case to persevere with appropriate remedies long after the symptoms had gone than to assume cure too hastily. Even to-day, however, there was no final answer to the question whether this should be done by intensive methods from time to time, by steady slow persistent small doses, or by intensive methods first, followed by persistence. The problem was not the simple one of a foreign foe invading the home country and wandering over the surface of the land, capable of being rounded up and chased across the frontier or killed in the open. The very first symptoms of disease indicated that the enemy was already dug in and that he had fraternised with the home troops and civilian population, even with the governing elements themselves. Syphilis was a good example of the swing of the therapeutic pendulum, and it gave a model for therapeutic exploitation, even though the physician might not subscribe to that quaint doctrine which held that there was only one disease and syphilis was its name. It was interesting to note a return to the older measures of Hutchinson: treating the patient by small doses of mercury for at least two years. The method of the storm troops was, however, still the favourite of many. Lord Horder described a case which illustrated what the human body could stand without lethal damage. After treatment at a hospital for syphilis the patient had been admitted to St. Bartholomew's Hospital with an intense black line on the gums, a good deal of gingivitis, and all his front teeth loose. Four days later, deep jaundice had appeared, and bismuth had been demonstrated in as little as 150 c.cm. of urine and arsenic in 0·25 g. of hair. Such thoroughness, such an implacable determination to purge the patient of his peccant humour at all costs, reminded Lord Horder of the reply of an examination candidate to a question on anthrax "with special reference to its preventive treatment." "This," he had said, "is very important. All infected animals must be burnt or buried alive, and the wool sorter must be boiled."

SHOCK TACTICS

The individual tolerance to drugs varied greatly for particular persons, and therein lay the chief risk. The trouble was that so little was known of the way in which drugs acted. It seemed certain that they acted indirectly rather than directly. The physician of to-day did not seem to have got much nearer to an explanation than those who had coined the old word "alterative." The only change he had made was to try to effect the alteration rapidly instead of slowly. The patient's power of adaptation made "shock therapy" possible. Quite a large number of modern treatments were really of this nature, though they did not bear this name. If the patient could withstand the severe jostle given him by the use of chemical shock his disease might be cut short. Unfortunately, so much reliance was often placed on this kind of remedy that nothing else was thought necessary. Lord Horder had recently been called to see a doctor who had developed influenza the night before and had sent for a colleague in the morning. The colleague had injected a dose of one of those preparations which it is claimed will enable an influenza patient to resume work quickly, and had departed full of hopeful good wishes. Finding himself distinctly worse in the afternoon, the patient had telephoned to the colleague, whose partner had then called and injected a rival remedy, likewise departing with hopeful reassurance. In the evening the patient had been so ill that his wife had taken fright and sent for the physician. The patient had by then been collapsed. First aid, by way of volatile stimulants and tepid sponging, and the installation of a nurse had resulted in the disease running its natural course uninterrupted by large chemical molecules. Far more safe, if more canny, was the method adopted by another practitioner who first injected his own particular variety of chemical shock, then wrote a prescription for ammonium acetate, squill, and sal volatile, to be taken four-hourly, and finally handed over 12 homœopathic powders to be taken hourly till the fever abated!

The lust for specific and single remedies which might find quick results laid bare a paucity of resource which struck the older practitioner as evidence either of hasty or incomplete training or of lack of experience. Expectant measures had always been scouted by lay relatives. "Is there nothing you can *do*, doctor?" was the common question. The older practitioner, faced with this query, carried on in silence or, if time and patience allowed and a semblance of understanding in one or two of the relatives deceived him into so doing, he pointed out that the sum of the expectant measures taken together often meant the difference between life and death. To-day, the doctor, having injected the magic dose, often did little else, and so was expectant indeed.

The relative infrequency nowadays of certain diseases and the lessened severity of others had removed from the experience of both doctor and nurse very valuable material. Severe enteric fever had given many opportunities of handling continued high fever, troublesome tympanites, diarrhœa, and rectal hæmorrhage, but when these symptoms appeared to-day in other diseases they were apt to get very scant attention. The management of high pyrexia in influenza was often of the crudest kind. The older practitioner must be struck with the general air of restlessness and bustle in our modern efforts. Hilton's "Rest and Pain" had been one of his text-books, but was now read only rarely. Yet the principles governing resolution of inflammation had not changed. Nature was as conservative as ever, and would not be budged one iota. Coax her, yes; lead her, yes; educate her, yes; but bully, shove, or hector her, no. The time element could not be eliminated, even if it could be shortened, in the process of healing.

He did not intend an indictment of modern therapeutic methods in general, but he did feel that a word of warning was necessary against the incursion of the "mass man," the apostle of direct action. He did not say that the past times were better than the present, but he believed that the only way of avoiding both the past and something worse was to use the past and all its teaching for the purpose of new endeavours. He was sceptical of tendencies that dissociated themselves from known physiological principles and of remedies that were thrust upon the profession from outside, the result of ill-digested hypothesis never submitted to proper control. No doubt our fathers had thought too much and tried too little, but perhaps we had reversed the error. Though already dyspeptic with new facts we clamoured for more food to bolt. We suffered from a sort of mental achylia. There seemed no time to chew, and thought—the juice by which facts might be prepared for assimilation—had become démodé. A table of figures or a mathematical formula gave us the comfortable feeling of arriving at last at exactness and precision. But to produce these things was the function of the instrument and the machine, rather than of the mind. He believed whole-heartedly in research, but he sometimes wondered whether it would not help to close down the laboratories for a

while and get together and try to see where we were. Although science had never offered so many new facts and new instruments for possible exploitation in therapeutics, we seemed less capable than before of making use of them, except by direct action. The proper adaptation of scientific discovery to therapeutics required the careful application of physiological principles and a knowledge of the deviations from the physiological that constituted disease. But this involved indirect action. In the therapeutic, as in the national field, direct action involved a great adventure, which, if it succeeded, must inevitably be followed by a return to principles from which there was no permanent escape, but if it failed spelt worse disease or death. There were things that could be done in therapeutics that might not be worth doing.

ROYAL SOCIETY OF MEDICINE

SECTION OF OTOLOGY

AT a meeting of this section on May 5th, with Mr. J. F. O'MALLEY, the president, in the chair, a discussion on the treatment of

Chronic Suppurative Otitis Media

was opened by Dr. T. RITCHIE RODGER (Hull). In its present state, he said, the problem of chronic otitis media could be regarded as a reproach to the profession, and particularly to otologists; for no other suppurating sinus in the body was treated usually with such levity and inaction, despite the fact that here peculiarly lay a potential danger to life. Otologists were now much more numerous than they were a few years ago, and if, as he contended, otitic disease was not correspondingly reduced, it was time to take stock of the situation and decide what should be done. The public was now much more enlightened on these subjects and more willing to coöperate.

Every case of chronic ear discharge had had an acute stage, and the chronicity was mainly due to early mismanagement. In the acute stage paracentesis must be done if opportunity presented itself. Nature's method of relieving the intratympanic pressure was to cause a sloughing of part of the membrane. There was no control over the size, shape, or site of the perforation, and it might be badly situated for drainage or too large to allow of restoration. On the other hand, the linear incision of a well-performed paracentesis could be relied upon to heal when its purpose had been served. Before treatment was begun the otologist should carefully explain, both to the family doctor and the patient or guardian, the principles underlying the measures he would adopt—namely, that if the paracentesis or spontaneous rupture was not followed by fairly early cessation of the discharge, even if all other symptoms had subsided—operation must be considered. It was necessary to fix a time-limit, and adhere to it, whether it was four or six weeks, or even longer. The object was to safeguard the patient from chronic infection, and it should be impressed on all concerned that at this stage operation was almost without danger, and could reasonably be expected to stop the discharge, with complete restoration of hearing.

When the condition at first examination was already chronic, the method should be the same; if the first attempts did not succeed in stopping the discharge within a reasonable time, it had to be assumed that there was deeper mischief, and that operation would be necessary to remove it. Here, even more than in the acute case, it was a duty to advise the patient of the danger attached to chronic suppuration in the ear, and the practitioner also must be reminded of this element of danger, since he saw but few cases, and had not the material before him which so impressed the operating otologist. Anything which obstructed an efficient ventilation of the Eustachian tube must be corrected, whether such obstruction was in the nasopharynx or the nose.

In the treatment of the ear itself Dr. Ritchie Rodger used the dry method. At the first visit the ear was syringed with the object of clearing out the meatus thoroughly. After this, intratympanic irrigation by gravitation and a Hartmann's cannula was used to wash out the middle ear. Then the canal was dried with mops and the patient instructed to self-inflate by Valsalva's method, a mop being held in readiness to pick up bubbles of air and fluid, until the blow-through sounded dry. Fine boracic acid powder was then blown into the canal by an insufflator. The patient was told to return as soon as the ear became moist—or in a week or two at longest—since moisture might have returned without having been noted. If discharge was again seen, the process must be repeated. About half the cases of chronic discharge could be cured by this means. If granulations were present, the prognosis was not so good.

Dr. A. R. FRIEL pointed out that sepsis was a factor common to all cases of chronic otorrhœa, though it was not always the sole factor. The sepsis in otitis media did not penetrate to any depth in the tissues, but if a necrotic area existed it was found to be swarming with germs. Usually the sepsis was accessible, so that the obvious treatment was a form of antisepsis applied directly to the surface. For this the claims of zinc ionisation were strong. The zinc combined with the albumin in the discharge, and the resulting precipitate formed a protective barrier. The ideal therapeutic agent must permeate to a sufficient depth but must not irritate the subjacent tissues, and these requirements were met by zinc ionisation. The fluid was allowed to run from the ear after the treatment, and if there had been congestion it was well to leave some boracic powder in the ear. Having got an efficient treatment for the sepsis, one derived a clue as to how to deal with complicated cases.

Mr. T. B. LAYTON thought that the problem of chronic otorrhœa was not so much, in these days of clinics and social agencies, a reproach to the medical profession as to the nation as a whole. Usually a natural perforation was quite small, and no sloughing resulted. The chief trouble in these cases was due to the invasion of secondary organisms into the mastoid region. There was a greater risk to life from the radical mastoid operation than from the simple Schwartze. A chronic running ear was a real handicap in the labour market, as also was evidence of having undergone the radical mastoid operation, even if the result had been perfect.

Sir JAMES DUNDAS-GRANT spoke of a case in which a young girl had a very large perforation, for which it was intended she should have a radical mastoid operation, but he was able to stop the aural discharge by injecting chloride of zinc solution into the Eustachian tube. This injection could be effectively carried out through a Eustachian catheter. Sometimes polypi grew from the edges of the perforation, and the portion inside might be wider than the perforation itself. In one case he was able to force out the polypus and snare it, so bringing about a cessation of the discharge. Another means of

treatment was with the galvano-cautery point; in this way sometimes polypi which had been the reason for the discharge had been brought away.

Mr. DOUGLAS GUTHRIE (Edinburgh) said that in the Army suppurative otitis media had been and remained one of the commonest causes of rejection of recruits and of invaliding. He saw every recruit in Scotland, and he did not hesitate to reject any candidate who suffered from chronic suppurative otitis, even though by the time he was seen the ear might be dry. It was also the custom to pension off men who were actually serving, unless they were near the time of retirement. It was of no use to perform radical mastoid operations in the Army, because the operation did not render men fit. It was not uncommon to see intracranial complications following acute otitis media in the acute stage, but he had seen these only once in a chronic case. Conservative treatment having been decided upon in a given case, he insisted that this must be thorough; it should not be left to the mother or a nurse to carry out, the otologist must himself do it. He had himself recently taken up the ionisation treatment with success, but it needed great care and attention to detail.

Mr. L. GRAHAM BROWN agreed that in most cases the simple Schwartze operation sufficed, though for long-continued suppuration he had been doing transmastoid attico-tympanotomy, which was first suggested by Charles Heath 30 years ago and was modified by several otologists later. He had found this operation very satisfactory.

Mr. JAMES ADAM (Glasgow) expressed his general agreement with Dr. Ritchie Rodger's views. For many years he had been carrying out occlusion of the Eustachian tube in the radical operation.

Mr. W. S. THACKER-NEVILLE (Harrogate) considered that the wide dissemination of Dr. Ritchie Rodger's paper in the profession would be of real benefit. Cases of chronic otorrhœa would get far better treatment in otologists' consulting-rooms than in crude clinics.

Dr. SOPHIA JEVONS said that to reduce the incidence and complications it was necessary to come out into the open and explain the possibilities of cure. From close observation she entertained much admiration for Dr. Friel's work with ionisation.

Dr. RITCHIE RODGER, in reply, said he had tried ionisation, but did not secure such good results as did Dr. Friel; he adhered to the old-fashioned treatment which he detailed in his paper. It was very important to get the ear clean before putting in the wall of protective antiseptic powder; this should be left in the ear until it began to break down of itself. If the suppuration had extended into the antrum no conservative treatment was likely to succeed. He did not think the chronicity of these cases depended on secondary organisms, but on the site which the suppuration had reached. Mastoid tenderness in the early stage—i.e., before rupture—did not mean there was necessarily infection of the mastoid process.

EUGENICS SOCIETY

AT a meeting of this society held on May 3rd, Dr. AUBREY LEWIS read a paper on the

Inheritance of Mental Disorders

He said that as the result of the very active inquiry into the subject during the last two decades, there is now a definite, though far from complete, body of knowledge about the inheritance of mental disorder. There had been much sifting of the evidence and examination of the methods employed. The difficulties were partly psychiatric and partly biological. The psychiatric problem depended mainly on the provisional nature of the current groupings, which might not have biological validity. Hysteria and schizophrenia were examples of this difficulty: if one contrasted them with some of the neurological disorders, the difference was striking. The uncertain relation of types of personality, not necessarily abnormal, to pronounced mental disorder also resulted in much controversy. The biological problem concerned chiefly the choice of methods, especially statistical methods, and the question of constitution, blastophthoria, and multiple gene determination. Most of the more strictly genetic troubles in this field had arisen from inadequate use of the available methods and data. Important obstacles to research had been the relatively long life of the human subjects investigated and the inaccessibility of their families to full investigation. For example, in involutional melancholia one could draw no conclusions about the patients' children until they had reached their fifth or sixth decade of life, and the patients' parents were usually dead by the time he or she was seen. A single investigator was hampered by this circumstance and by the inadequacy of diagnoses made by others many years before. In spite of the difficulties enumerated, much useful information had been collected. Investigations in a rural area where the population remains settled through several generations were of special value. Definite knowledge had been obtained on the inheritance of rare conditions such as Huntington's chorea and myoclonus epilepsy, and the affective psychoses had been found, especially in their characteristically endogenous forms, to show a high transmissibility. In schizophrenia the forms in which physical or psychic trauma had been a prominent causative factor showed less striking hereditary relationships than the far more numerous group, commonly known as dementia præcox. In paranoid states, paranoia, psychopathic forms, cerebral arterio-sclerosis, the relations were complicated. It was usually possible in any individual case to predict the probable risks for the offspring if sufficient information was available about the family history on both sides.

Investigations were at present being conducted at the Maudsley Hospital into special and general problems in the inheritance of mental disorder. These referred to the special inheritance of obsessional states, of schizophrenia in children, of involutional melancholia in men, and the psychoneuroses associated with compensation claims and prolonged unemployment. More general studies were being made of mental disorders in twins, in the children of parents who had both been insane, and in the general population. Special methods were needed for each of these studies. The coöperation of one or more specially trained psychiatric social workers was essential. The assessment of the frequency of mental disorder and abnormal types of personality in the average population was of great importance for genetic prognosis. Mendelian relations could not always be determined satisfactorily for mental disorders, but empirical studies had yielded valuable information on the frequency of a given mental disorder in the different relatives of a patient with the disorder. It was necessary to ascertain whether the frequency discovered was any greater than that which would be found if one started with unselected members of the average population.

For the study now being carried on, patients in the surgical ward of a general hospital had been the starting point; data were thus obtained for the average population of a given district of London. Individual genetic prognosis was the chief concern of the doctor; he was often asked by patients or by the children of patients whether they should marry and have children. The question of marriage was not, but procreation was, essentially a matter of genetic concern. It was, as a rule, unwise for a tainted person to marry one in whose family a similar morbid taint was present, if the couple proposed to have children. The particular risks could never be settled merely by making a diagnosis and applying a simple rule; careful inquiry into the family history of both husband and wife was essential. Where this was possible, it was seldom difficult to reach a conclusion. In many cases the psychiatrist would refrain from giving advice, but would merely state the probabilities and relevant facts and leave the decision to the people concerned. Positive qualities of personality and intellectual or other endowment must be taken into consideration as well as the negative qualities of mental disorder. This was also an important consideration in schemes of national improvement by the elimination of mental disorder. It could not be said that the knowledge at present available would be sufficient, if applied in the widest possible way, to eradicate mental disorder. It was questionable whether in any case so drastic a measure would be advisable, since many valuable qualities might also be eliminated. Until further knowledge of the inheritance of normal personality and special endowment was available, as well as of the inheritance of mental disorder, schemes of this kind were premature. One would hope for the maximum provision for the giving and implementing of eugenic advice to individuals. But carriers, not themselves manifesting the disorder, could not at present be recognised with certainty, and measures to eliminate mental disorder must therefore fail to achieve more than a small or moderate diminution in the total incidence. Both for individual and national well-being, the collection of further knowledge by painstaking and critical genetic research was desirable. It was necessary to compile accurate records and to train competent and enthusiastic workers for research of this kind.

REVIEWS AND NOTICES OF BOOKS

Great Men of Science

By PHILIPP LENARD, Nobel Laureate. Translated by STAFFORD HATFIELD. With preface by Prof. E. N. DA C. ANDRADE. London: G. Bell and Sons, Ltd. 1933. Pp. 389. 12*s*. 6*d*.

THIS is a history of scientific progress described through the medium of a series of biographical portraits whose subjects range in date from Pythagoras and Archimedes to Clerk Maxwell, Crookes, and Heinrich Hertz, under the last of whom the author himself worked. Sixty-five men are selected to illustrate a great story of continuity in discovery, and the composition of the list is somewhat surprising until the principles upon which it has been made are grasped; for while the list must appear brief, seeing that the progress of over 2000 years is being considered, it none the less includes names that will be familiar to few who are not working in the world of physics. Both the omissions and additions are mainly accounted for by the fact that Prof. Lenard does not take art or philosophy into account—regarding medicine, it would seem, as a blend of these—but finds room for the biographies of special workers in physics whose contributions to knowledge have been of fundamental importance. The list of such men he finds to be brief, and he finds also, in some pessimistic reflections, that additions to it are needed at the present day.

For a man to find a place in Prof. Lenard's list it is not sufficient for that which he has begotten to be new, it has also to be supplemental to previous knowledge at the time or to be found later, in light of further experiences, confirming such knowledge and assisting in its further potentialities. Discoverers of such new things are the founders of our present progress in knowledge and technical power. For example, in astronomy we have the separate contributions, set out with their general message, of Copernicus, Tycho Brahe, Kepler, Galileo, Huygens, and Newton, who enabled man to see the visible world as one great unity. In electricity we are far less familiar with the rôles of the protagonists, and here the sequence of biographies forms an even clearer picture of the interdependence of knowledge and of the difference between the really new things and the development of the old things which do not add to fundamental wisdom. The group may be started with Faraday, that prince of original investigators, though he was Humphry Davy's pupil, and is continued by Wilhelm Weber, Julius Meyer, Joule, and Helmholtz. Their work, though separate, was interdependent; reaching backwards it is founded on the labour of Laplace, Ampère, Ohm, and Gauss, while reaching forwards it makes contact, intimate or otherwise, with the discoveries of Helmholtz, Kelvin, Clerk Maxwell, and Hertz. How each of these relied upon the results obtained by the others, and how their joint efforts brought about units of standardisation on which the world relies in the most important fields of development, make the material of a fascinating section of the book; continuity could not have been more aptly exemplified. Similar sequences, as they appear in the book, could have been brought forward to show how associated researches along widely differing lines give results which perpetually reinforce and interdigitate with researches in other spheres of investigation. To the readers of this book the veritable leaders of scientific thought and action will appear as members of one great family.

Inherited Abnormalities of the Skin and its Appendages

By E. A. COCKAYNE, M.D., F.R.C.P., Physician to the Middlesex Hospital, and to Out-patients, Hospital for Sick Children, Great Ormond-street, London. Oxford Medical Publications. London: Humphrey Milford, Oxford University Press. 1933. Pp. 394. 32*s*.

THIS book, as Dr. Cockayne says in his preface, is an attempt to deal with the genetics of the defects which cause some change in the skin, teeth, hair, or nails. It is an analysis from the genetic point of view of *all* the hitherto recognised congenital-developmental abnormalities and "diseases" in any way affecting the skin and its appendages. The task set himself by the author must have involved an immense amount of labour spread over years, and

his devoted work has resulted in a concise manual which constitutes a real mine of wealth for doctors in general, and in particular for those specially interested in children's diseases and dermatology. Wherever possible Dr. Cockayne has drawn conclusions as to the mode of inheritance of the defects or "diseases" under discussion.

The first 49 pages are introductory and constitute in themselves a short clearly written introduction to the whole subject of genetics in pathology. They include an account of what is known about mutations and the possible causes of mutations and explanations of the terms "biotypes," "atavism," and of the so-called "stigmata of degeneration." It is to be hoped that the book will stimulate the collection of data on the various subjects dealt with, and perhaps the author himself will live to obtain, amongst other information that he desires, "the ratio of the isolated cases of a defect, which in some families is handed down by direct descent, to the family groups" of the defect in question.

It is difficult to think of anything that Dr. Cockayne has omitted. Perhaps in connexion with lipoidal metabolic errors he might have referred to the Hand-Schüller-Christian disease (lipoid granulomatosis), particularly as the third case of pituitary xanthomatosis causing diabetes insipidus which he quotes (p. 88) has been considered by H. Rietschel [1] to be an atypical example of lipoid granulomatosis. In Rietschel's first case, which is illustrated in his article, the condition of the teeth was a feature.

Clinical Ophthalmology

For House Surgeons and Students. By J. MYLES BICKERTON, B.Ch. Camb., F.R.C.S., Senior Surgeon, King's College Hospital, Surgeon and Dean, Royal Eye Hospital; and L. H. SAVIN, M.D., M.R.C.P., F.R.C.S., Junior Ophthalmic Surgeon, King's College Hospital, Assistant Surgeon, Royal Eye Hospital. London: H. K. Lewis and Co., Ltd. 1933. Pp. 158. 7*s.* 6*d.*

THIS book is adapted to the requirements of a student commencing work in the ophthalmic out-patient department. It begins by defining a method of preliminary examination without instruments, introduces the student to the ophthalmoscope, and then, after 50 pages describing the diseases ordinarily encountered in the out-patient room, devotes a short chapter to sight-testing for beginners. It is perhaps as well that the student should know that there are such things as contact glasses, but in a book of this sort the three pages on this subject would be more usefully devoted to a demonstration of the optical principles of retinoscopy such as is generally given in elementary books but is here absent. Squint, concomitant and paralytic, and ocular injuries, including sympathetic ophthalmia, are briefly discussed. A dozen pages with seven drawings serve as an introduction to the study of the fundus in disease.

The book will doubtless be useful to students and to those house surgeons who have had no time to devote any serious attention to eye-work before graduating. For a house surgeon responsible in any degree for the care of ophthalmic patients the bulk of it should be superfluous, but he may find useful certain sections such as the diagram explaining the principle by which a hole in a detached retina can be localised preliminary to Gonin's operation—also a list of instruments required for many ordinary operations. On the other hand, he will find here little to help him in the discharge of his responsibility for the after-treatment of such common operations as that for cataract.

[1] Zeits. für Kinderheilk., 1932, liv., 78.

Eye, Ear, Nose, and Throat

By E. V. L. BROWN, M.D., Professor of Ophthalmology; LOUIS BOTHMAN, M.D., Associate Professor of Ophthalmology; GEORGE E. SHAMBAUGH, M.D., Professor of Otology; and ELMER W. HAGENS, M.D., Instructor in Otology, University of Chicago. Series 1932. Chicago: The Year Book Publishers. 1932. Pp. 686. $2.50.

This annual has been increased in size, and consists, as before, of abstracts from the current literature of the world in 1932 and the latter part of 1931. The abstracts of the more important articles are fairly full; all are clearly and efficiently summarised, while in many places their value is increased by sane and shrewd editorial comments. The subjects which are discussed include the entire scope of these specialties; the articles range from the common affections to such a rare case as that of teratoma of the antrum in a new-born child. Of the more important articles, W. D. Harmer's work, embodied in his Semon lecture for 1931, on radiotherapy in the treatment of cancers of the upper air-passages, finds a place, as also do Sir Charles Ballance's recent experiments on the introduction of nerve grafts into the Fallopian canal for the treatment of facial palsy. Incidentally, neither of these authors' names appears in the index of authors. The book is a valuable addition to current reference literature.

Études cliniques de syphiligraphie

By E. SCHULMANN, Méd. des Hôpitaux de Paris. Paris: Masson et Cie. 1932. Pp. 290. Fr.40.

THESE 15 essays, on subjects the choice of which appears to have been quite haphazard or occasioned by the striking or unusual case of the moment, are illuminating. The first of them discusses the value of the history in estimating prognosis, and lays stress on the possibilities of errors by the patient—accidental or purposive. There follow discussions on the infectivity of syphilis before the appearance of the chancre, the danger of occult infections, clinical forms of syphilis without chancres, the importance of lumbar puncture in the study of nerve syphilis, pruritus and syphilis with particular reference to exceptions to the old rule that "luetic eruptions do not itch," and the pruritus of tabes, general paralysis, and that engendered by salvarsan treatment. An excellent chapter is that which contains a dissertation on the asthenia occasioned by the disease in its different stages, and by the various treatments in vogue at the present day. The syphilitic ulcer of the stomach is considered worthy of a chapter to itself, and it will be news to most syphilologists that it can occur as a specific manifestation in the secondary as well as the later stages of the disease. The pyrexia of syphilis receives due consideration, and also sterility caused by the disease. Dr. Schulmann believes in a natural immunity and devotes a whole section to his arguments, with illustrative cases. He has not forgotten a most important problem—the criteria of cure—and some 30 pages are devoted to its discussion.

This is undoubtedly a book to pick up in a leisure hour. Its material is absorbing and its style lucid.

THE LANCET

LONDON: SATURDAY, MAY 13, 1933

WAYS AND MEANS OF DIPHTHERIA IMMUNISATION

AT a recent meeting of the Society of Medical Officers of Health there was a record attendance to hear papers [1] read by Dr. E. H. T. NASH and Dr. J. GRAHAM FORBES upon the possibilities and difficulties of diphtheria immunisation. Dr. Nash, who showed a large number of slides to illustrate American propaganda and its results, also gave an account of the methods he had adopted with success in the borough of Heston and Isleworth. A film he had taken at an ordinary session of a clinic demonstrated that the actual Schick-testing and inoculation were regarded without apprehension by the children themselves. Dr. Forbes, the historian of diphtheria prevention, dealt more particularly with the progress recently made—or, more often, not made—in various parts of the British Isles. Both were careful to point out that in assessing the causes of any decline in the incidence of diphtheria in a locality, full consideration must be given to the periodicity of the disease. But whereas Dr. Nash, from the American figures and, on a small scale, from those of his own area, showed convincingly that immunisation alone was capable of diminishing incidence considerably if carried out upon sufficient numbers, Dr. Forbes was constrained to point out that elsewhere in the country, with the possible exception of Birmingham and Walsall, the numbers of the child population so far protected in the various towns are insufficient to affect incidence and mortality-rates. Dr. Nash's remark that our attempts in this country are, compared with those even in Honolulu, "like playing doll's house" was amply justified by the meagre figures which Dr. Forbes, always hopeful of better things, had perforce to quote in his paper. Not all American propaganda is suited to our minds but, as Dr. Nash has been able to show, there is a happy medium between the intensive campaign of press and wireless and the uninspiring diffident handbill prepared with one eye on possible local opposition.

Nor are all the American methods successful in their appeal. In a recent account [2] of diphtheria control in Chicago, H. N. BUNDESEN, W. L. FISHBEIN, and H. C. NIBLICK quote the experiences of the commissioner of health in Detroit, Dr. H. VAUGHAN, who found that a general educational programme through the newspapers, the wireless, bulletins, and the like, secured a response in only from 18 to 20 per cent. of the children; but when nurses visited the homes from 60 to 90 per cent. of the parents approached consented to their children being immunised. When, in 1931, it was decided in Chicago to enlarge the scope of immunisation work, which previously had been confined to children of school age (and had, therefore, been unsuccessful in reducing incidence), domiciliary visits by nurses to the parents of all children between the ages of 6 months and 8 years were regarded, and later proved to be, by far the most successful means of securing consent. The advantages of immunisation must literally be brought home to the parents by personal explanation. In Chicago also it was found that a number of parents owing to poverty or domestic difficulties were unable to take children to be immunised. By means of suitably equipped 'buses, immunisation was brought to their doors. Bundesen and his colleagues consider that distribution of literature is only of value in paving the way for the visits of nurses, and cannot in itself bring about the protection of children. Nor, they state, will this be secured without the coöperation of organised medicine. In order to affect prevalence, as E. S. GODFREY showed in New York State, a minimum of 35 per cent. of preschool-children, and at least 50 per cent. of school-children must be immunised. Prior to 1931, although a quarter of a million school-children had been immunised in Chicago, 70 per cent. of the cases of diphtheria were occurring amongst them; but the remaining 30 per cent. of the cases which occurred amongst preschool-children accounted for 50 per cent. of the total mortality. It is clear that mass immunisation schemes which are confined, or virtually confined, to children of school age are largely waste of effort and money. The child must be immune before school life begins. The result of the intensified campaign in Chicago was a remarkable reduction in incidence and mortality. In 1930 the case-rate per 100,000 was 146·3 and the death-rate 12·1. In 1932 these rates were 35·9 and 1·8 respectively. There were in certain areas groups of children whose parents disapproved of immunisation. These areas were like small cities in which, to quote the Chicago observers, diphtheria cases and deaths may persist and the disease become epidemic, even although in the city as a whole more than 85 per cent. of the preschool-children and 60 per cent. of the school-children have been immunised. In order to obtain complete protection no such large groups should be allowed to go unimmunised. Godfrey's minimal percentages must obtain uniformly throughout the city.

Dr. Nash insists upon the importance of preliminary and confirmatory Schick tests. He comments adversely upon a resolution of the League of Nations conference on immunisation [3] to the effect that, while it is unnecessary to carry out the Schick test before immunisation, it is desirable to do so before and afterwards in a certain proportion of subjects in order to determine the value of the method employed. There is no doubt that wherever possible, as in small clinics and institutions,

[1] Public Health, May, 1933, pp. 245–271.
[2] Jour. Amer. Med. Assoc., April 8th, p. 1093.
[3] Quart. Bull. League of Nations, March, 1932.

preliminary and confirmatory tests should be done. But where really large numbers of children attend, possibly from considerable distances and at some expense and inconvenience, it is important on the one hand to economise the time of the available medical staff, and on the other to reduce the number of visits which have to be paid. These factors have been considered by many to outweigh the disadvantage of immunising some children who are already immune.

Much depends upon local conditions. All are not so favourably circumstanced as Dr. Nash. The correct interpretation of confirmatory Schick tests is not always easy. There is little doubt that some of the readings of confirmatory tests which would appear to show a high percentage of failures to bring about immunity with a prophylactic of proved value have been incorrectly interpreted. After active immunisation pseudo-reactions when unusually persistent are liable to be recorded as positives. It is interesting to note that in Chicago alum-toxoid, first described [4] by A. T. GLENNY and M. BARR, has been exclusively used since the autumn of 1932. Bundesen and his colleagues find that, as compared with toxoid alone, a far lesser number of reactions occur in children; there is a more rapid production of immunity, and a greater percentage become immune after two inoculations. They consider that, in the light of present knowledge, it is the most efficient immunising agent against diphtheria. Their experiences may be compared with those of Dr. J. C. SAUNDERS and Dr. G. CHESNEY, recently stated in our own columns.[5]

PARADOXICAL BREATHING

BY the term paradoxical breathing is meant the deflation of a lung or portion of a lung during the phase of inspiration and the inflation of the lung during the phase of expiration. It is obvious that under such conditions efficient ventilation must be greatly decreased since on inspiration the affected portions of the lung receive only stale air from the other lung. Certain types of respiratory failure seem to depend in part on the occurrence of this form of breathing. Dr. E. KOROL [6] points out that the process occurs in all air-breathing vertebrates, depending upon the narrowing or closing of the glottis during certain respiratory acts and on the unequal pressure conditions prevailing in the different portions of the respiratory tract. While it may serve some useful purpose in amphibians and birds, it is difficult to see how paradoxical breathing in man can do other than impair respiratory function. The different regions of the chest differ in their respiratory capacity; during deep inspiration air is sucked into the active portions of the lungs (the basal regions) not only from the trachea but also from the inactive portions of the lungs. During expiration the process is reversed, and it can be shown that during deep breathing in normal subjects the apical regions may bulge during expiration and become deflated during inspiration. During the expiratory efforts of coughing or straining the mediastinal portions of the lungs are inflated and this paradoxical behaviour of the mediastinal and apical regions of the lungs is ætiologically related to the production of emphysema. When an open pneumothorax is present paradoxical breathing has been frequently observed, the healthy lung during inspiration sucking air from the collapsed lung, which becomes reinflated during expiration from the healthy side. The mediastinum moves to-and-fro and much respiratory and cardiac embarrassment follows, being lessened when the mediastinum is fixed by inflammatory adhesions or even when fixed by manual traction. Dr. KOROL shows that a similar mechanism occurs in asthma, with a rapid increase in residual air during an attack, and shows also how paradoxical breathing is responsible for the intrabronchial spread of tuberculosis and other infections in the lungs. This type of breathing is nearly always present after operations on the chest wall, especially if the anterior portions of the ribs are removed; it can be largely prevented, however, by protecting the chest wall against the effects of atmospheric pressure.

It is obvious that when paradoxical breathing occurs for any reason and the healthy portions of the lungs receive a mixture of stale air and fresh air, the former reaches the alveoli first so that the oxygenation of the blood is impaired. In other words, whatever the external ventilation may appear to be, as estimated by measuring the tidal air entering or leaving the upper parts of the respiratory tract at each respiration, the actual alveolar ventilation is considerably less than this. In a paper appearing in our columns last week on the "dead space" Dr. ALAN MONCRIEFF dealt with the same phenomenon from another aspect. By comparing the carbon dioxide percentage in samples of "expired" and "alveolar" air he has calculated the so-called "dead space" of the respiratory apparatus. In normal subjects this usually is about 30 per cent. of the tidal air, but it may be considerably increased by forced hyperventilation or in various diseased conditions such as pneumothorax. Putting it another way, Dr. MONCRIEFF shows that while normally 70 per cent. of the air reaching the alveoli is fresh air, in certain circumstances this proportion may drop to 50 per cent. or even less, thereby severely impairing the efficiency of true pulmonary ventilation. It is inconceivable that the anatomical "dead space" ever increases in size to the large figures obtained in some of Dr. MONCRIEFF'S results, which may perhaps be attributed, in the light of Dr. KOROL'S work, to paradoxical breathing in the sense that stale air from affected portions of the lungs is "inspired" into the more active regions. Whatever its explanation, or however the failure of intra-alveolar ventilation is expressed, it obviously represents one of the fundamental ways in which respiratory failure may arise. Dr. MONCRIEFF'S numerical estimation of the ventilating efficiency has the merits of presenting a means of comparison between the normal and the abnormal.

[4] Jour. Path. and Bact., 1931, xxxiv., 131.
[5] THE LANCET, April 15th, p. 791, and April 29th, p. 931.
[6] Arch. Internal Med., February, 1933, p. 264.

PRISONS AND PSYCHOLOGY

NOT long ago a Home Office Committee on Persistent Offenders recommended that a medical psychologist should be attached to one or more penal establishments to give treatment in selected cases. In the annual report of the Prison Commissioners just issued (Cmd. 4295, 1*s.* 6*d.*) Dr. NORWOOD EAST, the medical commissioner, welcomes the suggestion. He deprecates the overstatement that psychotherapy can cure many of our recidivists and most of our first offenders. He rejects the view that a full psychological investigation is required for every offender. The proportion of first offenders who become reconvicted is believed to be small, and better information can sometimes be collected from the ascertained facts of a crime than by psychological examination. Nevertheless, he naturally concedes that crime, though it is not synonymous with disease, may be the result of neurotic disorder. Psychotherapy in prisons will have its failures as well as its successes. There will be need of a careful check of the patient's after-history before a cure is confidently claimed. But the experiment which the Committee on Persistent Offenders has recommended will at least help us to solve an important problem—namely, in Dr. EAST's words, to ascertain how many law-breakers are genuine when they declare that they desire to be cured of the pathological condition associated with the crime and how many of them can be treated with success. One of the difficulties of such work in prisons will be the avoidance of attaching undue emphasis to abnormal conduct. We do not want to encourage morbidity and mental malingering. The coöperation of the patient is essential, but the prison inmate may be hostile, either because he clings to his anti-social self-gratification, or because he repudiates the idea of his abnormality. If he is not hostile, his goodwill may be simulated in the hope of escaping some of the legal consequences of his crime. Even genuine goodwill is easily commuted into hostility if a medical officer has to refuse some request which cannot be granted without invidious results. Not much can be done with the insane or the feeble-minded; but fortunately the Mental Deficiency Acts are gradually weeding these types out of our prisons; indeed, the level of prisoners' intelligence, education, and resourcefulness was never so high as it is to-day. Psychology presumably can do more with young prisoners than with old. If the criminal statistics show us an increase in juvenile crime, there is the greater opportunity.

Dr. EAST finds it convenient to classify convicted prisoners under four heads. The first class will contain those who become relieved of abnormal conditions without any special treatment. In this connexion he describes the curious case of a ship's officer, arrested on suspicion of crime, who had suffered a flight from reality, but who subsequently made a complete recovery by reassociation with his former self. This, though a neat instance, was not entirely the typical case of a convicted prisoner; better examples probably are the persons who attempt suicide and are restored to their normal mental state by the usual everyday methods. The second class contains those who attain readjustment as the result of information supplied by an ordinary psychological investigation. Cases with a hysterical background, common enough during and after the war, offer reasonable hope that some form of simple psychotherapy will give relief. In the third class come those for whose readjustment a complete psychological examination is required. Dr. EAST gives notes of two cases where prolonged treatment offered the best hope of ascertaining and removing the determinant cause of an offender's misbehaviour, mere punishment having proved to be no deterrent whatever. He is ready to accept the guarded claims of medical witnesses who advised the Persistent Offenders Committee that full psychological investigation and treatment were sometimes effective with homosexualism, exhibitionism, and obsession. The fourth and last class includes the residue of prison offenders who do not respond to psychotherapy at all. Until we make a beginning with psychological work in prisons, we cannot possibly tell how big or how small this class will prove to be.

ANNOTATIONS

ANTITYPHOID VACCINE

THE success with which fevers of the enteric group were kept in check in the army during the war is generally attributed to the protection afforded by prophylactic inoculation, introduced by Sir Almroth Wright, and elaborated by Sir William Leishman and his colleagues of the R.A.M.C. in the period preceding the war. Leishman, while satisfied that the vaccine was efficacious, hoped for still better results. In the Official Medical History of the War (Pathology Volume, p. 248) he wrote: "If it is the case that the vaccine used in the war of 1914–18 was superior to that employed in the South African war, it can hardly be doubted that the vaccine of the future will leave the present vaccine still further behind in protective value." There seems to be good prospect of this achievement. In a recent paper [1] Marrian Perry, Finlay, and Bensted have described the result of a careful experimental study of the famous Rawling's strain of *B. typhosus* from which was prepared the whole of the antityphoid vaccine used in the army during the war. Isolated from the spleen of a fatal case at Netley in 1900, this Rawling's strain was selected originally because it yielded a homogeneous suspension convenient for opsonic tests, and also because of its low virulence and proved suitability for inoculation. After continuous growth on artificial media for 33 years it was certainly desirable that the immunising properties of this strain should be re-examined in the light of recent advances in our knowledge of bacterial variation and antigenic complexity, and that more especially the prophylactic value of this Rawling's strain should be compared experimentally with that of more recent and possibly less senile strains of the typhoid bacillus. The observations of Marrian Perry and his colleagues have confirmed the contention of J. Grinnell [2] that

[1] R.A.M.C. Jour., April, 1933.

[2] Exp. Med., 1932, lvi., 907.

mice are particularly suitable as test animals for determining the relative prophylactic value of various strains of the typhoid bacillus. By employing this method of testing they found, as Grinnell had done, that a vaccine of the Rawling's strain in its present "rough" phase is far less protective than vaccines prepared with certain more recently isolated and more virulent "smooth" strains. In order to ensure the preventive value of antityphoid inoculation, therefore, the employment of one of these more recent strains would seem to be indicated. At the present time in antityphoid inoculation, as in anti-plague inoculation, a certain degree of toxicity of the vaccine appears to be essential for successful prophylaxis, and it is possible that the use of a vaccine prepared from more active strains may be followed by more severe reactions than those to which we are accustomed. Special regulations are in force in the army providing that men who are receiving antityphoid inoculation are kept off duty and at rest for 48 hours. Such regulations should be rigorously enforced in civil as well as in military practice, especially when typhoid vaccine is under trial. This is especially important when inoculations are undertaken abroad during the hot season of the year, as the after-effects are then liable to be more severe.

HYPOPROTEINÆMIA

THE best known association of hypoproteinæmia is of course with Bright's disease. The form of this disease that is commonly known as nephrosis is notably characterised by excessive loss of albumin through the kidneys, and a striking alteration in the albumin-globulin ratio leading even to inversion. The appearance of œdema seems to be intimately linked with the lowering of the albumin fraction, which supports Starling's law that the exchange of water between the blood and the body tissues depends upon a balance between the colloidal osmotic pressure of the plasma proteins and the hydrostatic pressure within the capillaries. Albumin having a smaller molecule than globulin is the more potent in exercising this colloidal osmotic pressure. It is doubtful, however, from the available evidence, whether E. Moschcowitz's thesis [1]—that the hypoproteinæmia produces the syndrome that has hitherto been classified under the heading "nephrosis"—is justified. The combination of œdema, inversion of the albumin-globulin ratio, and lipæmia may complicate two entirely different histological forms of nephritis. In one of these, the so-called nephrosis, the syndrome is more marked and more persistent than in the other, which is more frankly inflammatory. If the essential basis of "nephrosis" is hypoproteinæmia, then the condition should surely be curable by dietetic measures. But this is rarely the case.

Less attention has been paid to the possible occurrence of œdema through loss of protein from the alimentary canal in the gastro-enteritis of children. There are, however, some records of this association, and Moschcowitz quotes three cases in which œdema of the legs and a moderate degree of hypoproteinæmia were observed in the course of a protracted ulcerative colitis. The œdema was relieved by a high protein diet, but all three patients died. He also adduces evidence, from case-histories, that œdema may accompany the hypoproteinæmia due to loss of blood in ulceration of the intestinal tract. A similar association in pernicious anæmia cannot readily be explained in terms either of protein loss or of failure in protein production. The case quoted in this connexion seems to point to the operation of some other complicating factor, for the œdema actually began a week after the administration, for a fortnight, of liver extract and a blood transfusion. Hypoproteinæmia from deficient protein intake appears to be the cause of nutritional œdema, such as was seen among the peoples of central Europe during the late war. This œdema disappeared, to the accompaniment of polyuria, on administering a high protein diet. These observations have been verified by subsequent experiment.

[1] Jour. Amer. Med. Assoc., April 8th, p. 1086.

IN PRAISE OF BISMUTH SUBNITRATE

THE deletion from the British Pharmacopœia of bismuth subnitrate has probably astonished many practitioners. Though it is important to bear in mind the possible dangers arising out of the formation of nitrites when reducing bacteria in the intestine act upon the subnitrate, it is interesting to read so favourable an account of the subnitrate as that given by Dr. G. Lion in an article[1] dealing with the action of bismuth salts in disorders of the stomach. From his own observations, as well as those of Monneret and of Hayem, Dr. Lion concludes that bismuth subnitrate exerts its effect on the stomach partly by the protection which it affords to the mucosa against mechanical irritation. The results of test-meals suggest that when bismuth subnitrate is given all the chloride in the stomach is converted into the insoluble bismuth oxychloride, this chemical interaction being doubly valuable in fixing the chloride and providing protection equal to that given by the subnitrate. Dr. Lion contrasts this result with the conditions produced when calcium carbonate, magnesium carbonate, or similar compounds are given by the mouth, when chemical interaction yields products which tend to stimulate further formation of hydrochloric acid. In a case of dyspepsia associated with hyperchlorhydria the subnitrate was given with the meal and the effect compared with that obtained when the subnitrate was given one hour before the test-meal. In the former case the result was more satisfactory and emptying of the stomach was more rapid. In both the total acidity remained high, but this was mainly due to the presence of nitric acid which may have a useful astringent effect on the mucosa. Even when large doses of bismuth subnitrate were given for several days, absorption from the alimentary tract was negligible, hardly any of the salt appearing in the urine. On the other hand Dr. Lion finds that bismuth carbonate has the same disadvantages as calcium carbonate. But although his experimental evidence may point to the acid-stimulating effect of the soluble chloride derived from bismuth carbonate in the stomach, not many clinicians will be willing to admit such substantial difficulties with this drug in actual practice. In this country the occurrence of bismuth poisoning as a result of prolonged oral administration of the carbonate must be decidedly rare. Dr. Lion also deals with the external use of bismuth. Bismuth salts were first tried as external disinfectants for wounds about seventy years ago; the periodical occurrence of bismuth poisoning, often fatal, has clearly shown the danger of its use. The signs of poisoning are those of the heavy metals such as lead and mercury, but occasionally the complicating effect of nitrites can be distinguished. Dr. Lion and his colleague, Dr. A. Tulasne, studied the probable effects of the previously mentioned salts of bismuth

[1] Presse Médicale, April 1st, p. 516.

when applied to wounds. Each of the salts was heated with solutions of albumin of varying reaction. After 48 hours the reaction was again noted, as also was the amount of bismuth present in the metallic state and the amount present as the oxide. These experiments, for what they were worth, indicated the greater danger of the carbonate as compared with other salts of bismuth.

ACETYLCHOLINE AFTER FRACTURES

PAIN, stiffness, and bony atrophy are commonly seen after injuries in or around a joint, especially when the limb has been immobilised in plaster. Leriche calls this condition post-traumatic osteoporosis, and treats it by sympathectomy, apparently with satisfactory results. Roger Fisher,[1] of Geneva, now states that injections of acetylcholine every second day, over a period of 20 days or more, can effect a cure. He quotes an imposing number of cases to support his contention, and concludes that the clinical facts are established and have been confirmed. So pleased is he with the result of acetylcholine treatment that he now adopts it as a routine for the prevention of stiffness and pain wherever a joint has to be immobilised in plaster. The drug dilates the peripheral arterioles, and if the arterioles in an injured area are constricted acetylcholine's action should be the same as that of sympathectomy. But sympathectomy, though it may relieve the pain and stiffness, does not affect the atrophy of bone as seen by radiography. With acetylcholine, on the other hand, it is said that there is definite amelioration in the calcification of the bone, and Fisher suggests that it not only acts on the vasomotor system but also governs local calcium metabolism. This proposition should be considered in the light of the discussion on calcification and decalcification which was reported in our issue of March 25th.

SERUM IMMUNITY TO POLIOMYELITIS

ONE of the difficulties of arranging serum treatment for poliomyelitis is the scarcity of convalescents from whom serum may be obtained. The question has therefore arisen whether serum from healthy adults cannot be used instead. Across the Atlantic several experiments in this direction have been made; for example, M. Brodie in Montreal found that 76 per cent. of 29 apparently normal persons—not convalescent from the disease—gave serum with definite protective properties against the Flexner mixed virus of poliomyelitis. In our correspondence columns last December, however, Dr. Jean Macnamara pointed out that the proportion of persons showing such immunity probably varies with the opportunity of acquiring sub-clinical infections. Thus one must not assume, she said, that the percentage of immunes in England would be the same as in the eastern parts of North America, where the incidence of poliomyelitis has long been higher than it is here. It is interesting, therefore, to see the results of a small investigation made in Paris.[2] The serum of 15 adults living in localities where poliomyelitis had been observed was tested for its power to protect monkeys against a given dose of virus. In 10 cases out of the 15 tested the protection conferred was complete; in 1 it was "very marked"; in 2 it was appreciable; and in another 2 no effect was observed. It was noted that a mixture of the serum of three Parisians without any known connexion with poliomyelitis cases contained antibodies of the same strength as the serum of three people from Le Mans who had been in prolonged contact with patients. Netter and his colleagues at the Pasteur Institute are thus encouraged to believe in the usefulness of pooled serum from healthy adults as an alternative to convalescent serum. Dr. Macnamara, however, thinks that the introduction of normal (non-immune) serum into the theca will increase the damage to the central nervous system. For this reason, she holds that the attempt to use the serum of normal persons in treatment should be abandoned for the present, lest it may do actual harm.

[1] Presse Méd., March 25th, p. 475.

[2] Netter, A., Levaditi, C., and Hornus, G.: Bull. de l'Acad. de Méd., 1933, cix., 529.

WELFARE OF THE BLIND

SINCE the passing of the Blind Persons Act of 1920 the number of blind persons in England and Wales between 50 and 70 years of age who were in receipt of old age pensions in accordance with the Act has risen from 7826 in 1921 to 21,057 in 1932 at a cost of £525,000, the total number of blind persons between these ages being now 24,313. The total net expenditure by local authorities out of rates on work for the welfare of the blind amounted, in the year 1930–31, the last year for which figures are available, to £778,339, this amount representing a large increase over that in the previous year owing principally to two causes: (1) the system of block grants instituted by the Local Government Act of 1929 by which the whole of this expenditure is made directly by the local authorities instead of partially by the Government; and (2) the transfer of the provision of domiciliary assistance from the poor-law to the Blind Persons Act. The number of the registered blind population for whose benefit this public money was expended was, in 1932, 62,079, or 1 in 648 of the general population, both the total numbers and the relative proportion showing an increase which has been continuous since 1919. This increase is attributed [1] partly to the improvement of the machinery for registration, and partly to the inducement for persons, some of whom may not be blind within the meaning of the Act, to apply for and obtain registration as blind persons. Looking at the figures more closely, it is seen that the increase is mainly in the figure of blind persons over 50 years of age. The age-groups up to 21 show a continuous decrease, the figures confirming the view that the measures taken by the public health and school medical services for the prevention of infantile blindness and for the preservation of the sight of school-children are having an increasing effect in restricting the number of persons who become blind in early life. It is especially satisfactory to note in the returns of ages at which blindness occurred that the percentage of those whose blindness was complete before the age of 1 year shows a continuous decrease, so that in 1932 it was only 14·7 per cent. of the whole number of blind, as compared with 16·5 per cent. in 1929 and 21·4 per cent. in 1919. For the first time the largest proportion of the present blind population became blind between the ages of 60 and 70, the next highest group being that between 50 and 60, while the under-one-year-of-age group, which has hitherto always been the largest group, is now third.

The proper registration of the blind has become a matter of the first importance, both financial and social, but there are still local authorities which do not insist upon examination by a medical practitioner with special knowledge of ophthalmology before placing blind persons on the register. Twenty

[1] Tenth Report of the Advisory Committee on the Blind.

county councils and 47 county borough councils have included a clause in their schemes providing for such special examination, and 13 other local authorities do in fact require it. It is time that a careful examination, preferably by two independent ophthalmologists, as in Scotland, were made compulsory, at any rate in cases where the degree of blindness is in any doubt. When the system of dealing with our blind population has been made satisfactory there will still remain the problem of the borderland cases. A system under which the State does so much for a man who is able to read the largest letters on the test type at 3 metres distance, while it does nothing for those who at best can read the same letters at 6 metres, is sure to give rise to heart burnings. Not much has yet been done in this direction, but the appointment by the Board of Education of a committee on the education of the partially blind child is a step in the right direction.

MEDICAL WOMEN

THE dinner of the London Association of the Medical Women's Federation, held this year at Claridge's on May 5th, was evidently planned with discretion, for it combined the best features of such gatherings while avoiding the pitfalls that spoil many reunions. The dinner was not only excellent but was deftly served, the speeches were bright and not too long, so that hostesses and guests were soon able to assemble in an adjoining room for the informal postprandial talk which is often unduly curtailed after medical dinners. Dr. Jane Walker proposed the guests, and Mrs. Sylvia Lynd and Dr. Mabel Ramsay replied. Mr. Ralph Strauss proposed the London Association, and Prof. Mary Lucas Keene, who was in the chair, responded as its president. The prevailing good cheer was tempered only by a warning from Dr. Walker, who feared that a wave of reactionary opposition to the development of women's activities may be anticipated in England as in other European countries in the near future. It was clear that most of those present, assured of the stability of women's position in medicine, were unable to imagine that such a wave would do more than supply an invigorating douche to their progress.

POTASSIUM ARSENITE FOR POLYCYTHÆMIA VERA

NONE of the methods available for the treatment of polycythæmia vera is entirely satisfactory, but Forkner, McNair Scott, and Wu,[1] from a study of six cases, have come to the conclusion that potassium arsenite offers a safe and reliable method of palliation. The remissions induced were characterised by reduction in red cells and hæmoglobin, lowering of basal metabolic rate, increase in weight and strength, and disappearance of uncomfortable symptoms. There were no important toxic effects, the first symptoms of toxicity being no more than loss of appetite and mild nausea. Chemosis of the conjunctivæ occurred in some patients, but was not serious, and no permanent changes suggesting peripheral neuritis were observed. In one case there was mild jaundice when the red cells were decreasing rapidly. The authors suggest an initial dose of ℥ 3–4 three times daily for two days, to be increased by ℥ 3 daily every two days until the first sign of intoxication, usually anorexia, is noted. As a rule, the total daily dose has now reached ℥ 24, and it is advisable thenceforward to add only ℥ 1 daily. By this means a total dose of ℥ 36–60 may be reached, but there is great variability in the amount that can be tolerated. When the blood picture has improved or when the limit of tolerance has been reached the dose may be decreased by ℥ 1 daily until the patient is taking about ℥ 5 three times a day. Such a dose may be continued for several months. It is recommended that mild toxic symptoms should be disregarded, since the best results are obtained with a dose near the upper limit of tolerance.

[1] Forkner, C. E., Scott, T. F. McNair, and Wu, S. C.: Arch. Internal Med., 1933, li., 616.

MEDICINE AT THE BRITISH ASSOCIATION

LEICESTER has been chosen for this year's meeting of the British Association, and Sir Gowland Hopkins will deliver the presidential address, dealing with the Chemical Aspects of Life, on Sept. 6th. Of the fourteen divisions of the congress, those most intimately connected with medicine are the sections of physiology and psychology, but the provisional programme suggests that medical members of the meeting will find an unusual choice of subjects of more or less professional interest. The mathematicians, indeed, offer nothing more medical than a discussion, with the psychologists, on the validity and value of methods of correlation; but the chemists are devoting part of their time to hormones, the zoologists will hear a presidential address on the mechanical view of life, the geographers are concerned with the water-supply of Leicestershire and the growth of population in the Midlands, and the engineers are giving their attention to the treatment and disposal of sewage. The proceedings of the section of physiology will open with a presidential address by Prof. E. D. Adrian on the activity of nerve-cells, and afterwards there will be discussions on disorientation and vertigo, on ossification, and on the chemical control of the circulation. The psychological section, which meets under the presidency of Prof. F. Aveling, will join the physiologists in the consideration of disorientation and vertigo, and will also consider the inheritance of acquired characteristics, and various aspects of social psychology and personality. The section of botany will meet the sections of zoology and physiology in a discussion on genetics, the section of agriculture gives an important place on its programme to the handling and food value of milk, and the section of education will debate among other things the predictive value of school examinations and psychological tests, and the cultural value of science with special reference to adult education. Of the fourteen groups this leaves only the geologists and the anthropologists, who this year seem to stand outside the field in which medicine has staked out claims. Even these, however, need not necessarily be ignored. The research worker may well find instruction in papers on belief in fairies and other superstitions, while the practical man should be attracted by the discussion on the possibility and desirability of greatly increasing the production of gold.

SARCINA VENTRICULI

GASTRIC fermentation caused by sarcina was described by Goodsir nearly 100 years ago and his discovery gave rise to a good deal of observation and writing, though in recent years the topic has not been as popular as it used to be. A paper [1] by Dr. Jan Smit, of Amsterdam, clears up many misconceptions and gives a useful summary of our present knowledge of the organism. Early observers uniformly failed to cultivate it outside the body and identified as

[1] Jour. Path. and Bact., 1933, xxxvi., 455.

Goodsir's sarcina many common coccus-microbes growing in packets which were really quite different. Cultures were not obtained till Beijerinck showed in 1911 that the organism was anaerobic and needed quite strongly acid media with plenty of sugar: acidified maltwort has proved especially satisfactory. Pure cultures provided the necessary means for accurate comparison and identification, and with their aid it has been found that the genuine *Sarcina ventriculi* is a ubiquitous organism which can by suitable methods be cultivated from all samples of surface soil in many parts of the world whether wild or cultivated. The germs being present everywhere, it is not surprising that sarcina fermentation occurs in the stomach when conditions are favourable; the stomach is certainly not its habitat of choice. But in what form it lives in earth and other materials and there maintains its vitality for long periods, wet or dry, remains to be discovered and the problem has so far eluded Dr. Smit's efforts to solve it. It seems certain that the well-known packets of organisms, in which phase active fermentation takes place, have only a limited life; nor do they give rise to any resistant form comparable to bacterial spores. But in earth which starts free fermentation in acid maltwort nothing can be found microscopically which at all resembles any known stage of sarcina. A very interesting life-history evidently remains to be cleared up.

THE GALACTOSE-TOLERANCE TEST

AMONG the many tests of hepatic function, the galactose-tolerance test has claims to distinction, if only because it is still being employed more than 25 years after it was first described. Unfortunately this is less a tribute to its merit than to the failings of its competitors. It is based on the observation that the normal person after taking 40 g. of galactose by mouth excretes this substance in the urine in amounts which are usually less than 3 g. in the 5-hour period. When the mechanism of glycogen storage in the liver is upset, galactose tends to appear in the urine in larger quantities. It has been assumed that in obstructive jaundice glycogen storage is not impaired sufficiently to give a positive result, whereas in the so-called intrahepatic jaundice the parenchymal injury will be such as to interfere appreciably with the metabolism of galactose. Workers at the Mayo Clinic have lately examined the clinical value of the test and give an analysis of the results obtained in 107 cases of jaundice of various types.[1] The patient in each case fasted overnight, and after emptying the bladder was given 40 g. of galactose in 500 c.cm. water by mouth. Urine specimens were collected hourly for five hours, and tested for reducing substances by Benedict's qualitative test. All the specimens were then mixed, and the total amount of reducing substance was estimated and expressed as grammes. Of the 18 cases of acute and subacute intrahepatic jaundice in the series, the test was positive in 84 per cent., whereas only 15 per cent. of positive results were obtained in the 13 chronic cases of this type. The low percentage of positive tests in the chronic cases is attributed to regeneration of the hepatic tissue. In the obstructive types of jaundice a considerable proportion of positive results was obtained; it was highest in those due to malignant disease where there was presumably extensive parenchymal change from obstruction of long-standing, and lowest in those associated with calculus where the obstruction is usually intermittent and incomplete. The authors think that although the test obviously cannot be taken as an absolute differential criterion in distinguishing between intrahepatic and obstructive jaundice, it nevertheless has definite value in certain doubtful cases and may be used as an aid to clinical diagnosis. Gastric or urinary retention, and marked dehydration, tend to obscure the results.

[1] Banks, B. M., Sprague, P. H., and Snell, A. M.: Proc. Staff Meetings Mayo Clinic, March 29th, p. 194.

RECURRENT HERPES

THE prognosis of the average case of herpes progenitalis is gloomy, and the distress, especially the mental distress, of the unfortunate patient has occasionally resulted in suicide. Treatment, mainly directed hitherto to hygienic measures of a prophylactic kind before and after coitus, has been disappointing, and has rarely prevented the rhythmical return of the vesicular eruption. Some successes have been reported following X ray irradiation, but this method has obvious dangers and cannot be repeated indefinitely. Mr. M. A. Levy-Franckel[1] advocates "anti-shock" methods in the form of injections. The drugs used by him on eight cases of recurrent herpes, four of which were of the progenitalis type, were eosinate of cæsium and trypan-blue, a dye that has been in frequent use since it was introduced for intravital staining by Ehrlich. The former was injected in 6 per cent. aqueous solution from 5 c.cm. ampoules. The exact intervals are not stated, but may be assumed to have been about a week. The first case, a man with herpes præputialis, had 15 injections of the cæsium compound, and had been free of the eruption for 11 months at the time of writing. The second case so treated was a woman of 32 with a catamenial herpes of the left cheek. This patient had ten injections and remained free for 13 months, relapsing in February and March of this year. The third patient, a case of herpes præputialis, had five injections without much benefit, and is now undergoing treatment by trypan-blue injections. This is stated to be superior in action possibly because it is eliminated more slowly. It is given as a 1 per cent. solution in sterile water, each dose being 1–2 c.cm. Besides its relatively long retention this drug has the further advantage that extravenous leaks have no more serious effect than somewhat prolonged local staining of the skin. There are no constitutional complications to be feared. The dye is not excreted either in the urine or fæces, but solely and very slowly by the skin. Staining of the conjunctiva resulted in one case from a single dose of 6 c.cm. All the cases treated but one were favourably influenced and the rhythm of recurrence definitely interrupted. The method has the advantage of being easy to apply and free from danger.

[1] Bull. et Mém. de la Soc. de Méd. de Paris, March 25th, p. 254.

ANGINA PECTORIS IN PAROXYSMAL TACHYCARDIA

DETAILS of two instructive cases of paroxysmal rapid beating of the heart accompanied by anginal pain are given by M. Burak and D. Scherf.[2] They refer to the pain as "anginoid" but there is no reason why this *cramp*-like retrosternal pain occurring with tachycardia should not be referred to simply as angina. The differential diagnosis from ordinary angina of effort is important, however, because the prognosis may be much better. This differential diagnosis was rendered especially difficult in the cases described, since the paroxysms of tachycardia underlying the pain were always produced by effort and ceased with rest. In the first case—that of a man

[2] Wien. Arch. f. inn. Med., March, 1933, p. 475.

with a history of syphilis and a positive Wassermann reaction—effort, or two or three deep breaths would produce pain of typical anginal distribution. Simultaneously there was a change from normal sinus rhythm to auricular fibrillation, the ventricular rate not exceeding 130 with the irregularity. Fibrillation and the pain ceased at the same time. These phenomena could be produced at will and as often as desired. Treatment with quinidine did not prevent the attacks, but digitalis, while not lessening their frequency, produced a slower ventricle during the attacks and alleviation of the pain. The disturbance of cardiac rhythm after deep breathing remained unchanged. In the second case the patient was a woman of 35, in whom effort such as climbing stairs would bring on paroxysmal auricular tachycardia with a rate of 180. At the same time there was chest pain sometimes extending into the back and both arms. The pain ended at the same time as the tachycardia, but salvos of premature auricular contractions following the tachycardia were associated with a slight recurrence which was relieved by giving nitroglycerin. Radiography showed the heart to be enlarged to the right and left, and in the electrocardiogram there was a large split P wave and an abnormally wide ventricular complex.

The diagnosis of the cause of the pain in such cases will be easy if the patient is seen in attack. Otherwise a history of palpitation may help; but the first of these two reported cases had no palpitation. Anginal pain is, however, a rarity in association with auricular fibrillation, and it is commonly found that in effort angina the onset of the arrhythmia coincides with the disappearance of this pain. It now seems probable that most cases of concurrent fibrillation and anginal pain are the result of coronary occlusion. The mechanism of pain production suggested by Burak and Scherf is a relative deficiency of oxygen-supply to the heart muscle.

THE NUMERUS CLAUSUS IN GERMAN MEDICAL SCHOOLS

OVERCROWDING of the medical profession has for some time past excited concern in Germany. Five years ago there were 7·45 doctors to every 10,000 of the population, and well-informed opinion [1] regarded 7 per 10,000 as the upper limit of the number who would be able to earn a living. The proportion has increased since then although the financial situation has deteriorated. There were in 1927, to give actual figures, 47,338 medical persons registered in Germany, 2078 of them (or 4·4 per cent. of the total) being women. Now, according to a survey of medical schools, in the winter session of 1932–33 there were 25,277 medical students (20,224 men, 5053 women) and 6582 dental students (5196 men, 1386 women) in the whole of Germany, the largest numbers being (medical only) Berlin, 3127; Munich, 2760; Würzburg, 1555; Bonn, 1386; Heidelberg, 1242; Freiburg i. Br., 1238; Münster, 1194; Leipzig, 1133; Breslau, 1107. It should be added that 373 of the Berlin medical students (312 men, 61 women) were foreigners. Hitherto it has been found impracticable to limit the number of medical students by legal action, although appeal to young men to abstain from medical study met with some success, and the expedient of making examinations more difficult was seriously broached. The position has completely changed during the last few weeks owing to a decision of the Ministry of Education to limit the entry to medical schools on the ground that the probable need for doctors in Germany is now already covered for a period of nine years. It is stated that the entry of medical students at Munich is to be limited to 345, at Würzburg to 130, and at Erlangen to 98. In Prussia a similar measure is in contemplation but is not to be put in force until the effect of the voluntary labour half-year for school-leavers has been tested. Apparently the entries last summer to the high schools were already 20 per cent. below those of the previous year, and 30 per cent. in the case of girl students. A further factor in the situation is the inclusion of Austrian students for the first time among those who have student rights in Germany. The numbers concerned in this concession are large. For the last winter session they were officially given, medical and dental students combined, as: Vienna, 3770 (men 2979, women 791); Innsbruck, 1117 (men 939, women 178); Graz, 948 (men 824, women 124). The number of medical students is not separately given, but it must be at least four-fifths of the total. In view of the overcrowding the Minister of the Interior has decided to prohibit the admission of foreigners to medical schools unless in quite exceptional cases. Foreigners will no longer be able to reckon on obtaining the authorisation to practise in Germany, even when they have been at school there, have taken the regular course of study, and passed all the examinations. At Leipzig the definition of foreigner is such that no Jews are to be admitted to university courses during the next ten semesters, the distinction being made on the now familiar 25 per cent. basis.

Entry into the medical profession may be affected by the new spirit in which the profession is being regarded. At the recent congress of internal medicine Schittenhelm from the presidential chair defined it as the urge to a eugenic national regeneration. He congratulated the new league of medicine on its programme for the resurrection of the family doctor. The practising doctor had, he said, been receiving, instead of bread, ambrosia; physiological chemistry, formulæ, and animal experiment had occupied the field. Germany had been suffering too long from what might be described as "rabbit congresses."

[1] See THE LANCET, 1928, i., 731.

THE next session of the General Medical Council will commence at 2 P.M. on Tuesday, May 23rd, under the presidency of Sir Norman Walker.

Dr. Ivan de Burgh Daly, professor of physiology in the University of Birmingham, has been appointed to the chair of physiology in the University of Edinburgh which will be vacant on the retirement of Sir Edward Sharpey-Schafer in September next.

Dr. Adolf Meyer, of Baltimore, is delivering the fourteenth Maudsley lecture to the Royal Medico-Psychological Association next Wednesday, May 17th, in the Barnes Hall of the Royal Society of Medicine. His subject is Psychiatry and Mental Hygiene. Admission free to members of the medical profession.

THE death is announced of Miss Mary Dendy, a former commissioner of the Board of Control. Born in 1855, she spent the first 16 years of her adult life in philanthropic work for Manchester school-children, and in 1902 she summed up some of her experience in our columns in an arresting paper on mental deficiency and crime. She was appointed to the Board of Control on its formation, and after her retirement from this office in 1921 she remained chairman of the Lancashire and Cheshire Society for the Permanent Care of the Feeble-minded, of which she was the founder.

SPECIAL ARTICLES

TRAINING IN OBSTETRICS

BY J. M. MUNRO KERR, M.D. GLASG., F.C.O.G.
REGIUS PROFESSOR OF MIDWIFERY IN THE UNIVERSITY OF GLASGOW

I HAVE just learned from the minutes of the General Medical Council that the recommendations on training in obstetrics and gynæcology presented by its Joint Education and Examination Committee had not only been received by the Council, but accepted and issued as the Council's recommendations. Until then I was under the impression that the Council, when it issued the recommendations of its joint committee, did so for the purpose of inviting comment before issuing its own final recommendations. While in entire agreement with the recommendations of the General Medical Council in respect to the subject matter to be dealt with in training undergraduates in obstetrics and gynæcology, I feel that the objective of the training as outlined by the Departmental Committee on Maternal Mortality and Morbidity cannot be attained. The statement of this committee which I criticise is the following :—

> "For, first, every practitioner must know thoroughly well, and in a practical way, how to conduct safely a case of labour, particularly a complicated case. The need is absolute. Capacity in this respect is comparable to capacity to deal with the commonest emergencies of minor surgery, and no qualified medical man in ordinary practice can possibly afford to be incapable in either matter." (Interim Report, p. 107.)

THE LIMITATIONS OF UNDERGRADUATE TRAINING

It is necessary, I think, to be quite frank and definite that, no matter to what extent the curriculum for the undergraduate is extended as regard obstetrics, he cannot be trained to be capable "to conduct safely . . . a complicated case." The theory and principles of operative midwifery he can be taught, but experience in craftsmanship cannot be given him. Further, if any attempt were made to do this, the general public would immediately be up in arms and demand that it should cease. The majority of young graduates go into general practice shortly after graduation. The day they take up general practice as assistants or junior partners they may be called upon to deal with grave obstetric difficulties. At present they learn practical obstetrics from the mistakes they make. In time the individual learns the art, and if he has aptitude, practice, and is interested in obstetrics, he becomes a good craftsman.

Who is it, I would ask, that suffers as a result of this process of self-instruction? Each one profits, or should profit, to the end of his life by experience. But is it necessary that the young graduate should have to start right at the beginning in respect to operative obstetric work? Can no means be devised to modify the training so that he has had a little training in obstetric craftsmanship in a hospital and under supervision? For myself I believe it is possible.

The public is deeply interested in the subject of maternal mortality and morbidity. It has been told that matters are far from satisfactory, and it looks to the medical profession to correct these conditions. It is unfair, therefore, to let it believe that a more extended undergraduate training is the method of solving that part of the problem concerned more especially with providing women in labour with medical practitioners adequately trained "to conduct safely . . . particularly a complicated case." The undergraduate can be trained very completely in the principles of obstetrics and gynæcology, antenatal care, the management of normal labour, recognition of abnormalities, minor operative procedures—such as simple forceps delivery and repair of perineal laceration, care of the mother during the puerperium, neonatal infant welfare—and in gynæcology the diagnosis of abnormalities and the treatment of minor ailments. This is all that can be done in the period of undergraduate training. It is comparable to what the teacher in surgery can accomplish in his province.

ATTEMPTING THE IMPOSSIBLE

Many of the profession, and even some specialists in obstetrics and gynæcology, seem unable to realise that the undergraduate cannot be trained for more than is here detailed. Some are still obsessed with the idea of being able to produce, by the extended training suggested, a graduate who "can conduct safely . . . particularly a complicated case" on the day he is granted his licence to practise. This is a relic of the ideas of a former generation when the medical practitioner was supposed to be able to turn his hand to anything, either medical or surgical, which he encountered in practice. In the past this may have been possible, because of the then existing knowledge, and because the young medical aspirant had to serve a period of apprenticeship. To-day everything is altered. Increasing knowledge has changed the whole practice of medicine. There are now specialists in medicine and surgery, and in many subdivisions of both, and there is the enormous public health service, concerned with much that formerly was the domain of the general practitioner. This is all to the good of the community, provided that the practitioner, who is the backbone of medical practice, has his position preserved. Different it will and must be, and he must realise this. And yet there are greater possibilities in general practice to-day than ever before.

Do the teaching schools and the General Medical Council, concerned as they are to-day in considering modifications in the curriculum, keep prominently before their minds the changed conditions in general practice? Are they not possibly attempting too much by the regulations at present in existence and in modifications suggested in respect to the scope of undergraduate study? It would appear that the time has come when the professional training of the future medical practitioner must be subdivided into (*a*) a period of undergraduate study; (*b*) a period of post-graduate clinical training and experience (internship).

In the field of general practice great changes have occurred in respect to midwifery practice. In England and Wales 60 per cent., and in Scotland over 30 per cent. (in some districts in both countries 80–90 per cent.), of the women in childbirth are attended by midwives. A further development of a midwives' service for the country is recommended by the Departmental Committee on Maternal Mortality and Morbidity in both its reports, and by the Departmental Committee on the Training and Employment of Midwives (1929); the policy has the approval of the British Medical Association. The maternity service which these three bodies have indicated as being most desirable is one in which the routine care of the expectant mother and the mother in labour is to be the province of the midwife.

CHANGES IN DOMICILIARY PRACTICE

Many practitioners are not particularly interested in obstetric practice. If they have a junior partner or assistant they delegate, as far as they can, this particular work to him. In densely populated areas they only occasionally deal with difficulties in labour, as many cases in this category are transferred to institutions. The general practitioners in such areas cannot be expected to be as skilled in operative obstetrics as were many of their predecessors. The Departmental Committee realised this difficulty of maintaining efficiency without constant practice.

"It is recognised by the Committee that the number of normal cases conducted by a doctor under the proposed arrangements may be small, and that his experience may thereby tend to be unduly restricted. They think, however, that this objection is outweighed by the general advantages of the scheme. Moreover, they feel that the deficiency will be to a great extent made up by the doctor's private patients, by patients who, at their own expense, retain the services of a doctor, and by cases where he is called by the midwife for slight abnormality, and that by this means it will be ensured that he sees a number of naturally terminated labours, sufficiently large to keep him in touch with the normal course of labour." (Interim Report, § 174.)

Domiciliary practice in the future will be still further curtailed, for every committee, the Departmental Committee included, has advocated the limitation of operative treatment in the home of the patient. In view of this fact and the impossibility of training undergraduates for anything but minor obstetric surgery, of what profit is it to give an extended undergraduate training? Since many graduates have no intention of practising obstetrics, would it not be better to aim at a modified undergraduate training—three to four months (one month in residence)—in obstetrics, with a further term of training after graduation should the graduate desire to practise obstetrics?

The resolutions of the General Medical Council, which came into operation on Jan. 1st, 1923, do nearly meet the requirements of to-day. The fault has been not in the regulations but in the fact that few teaching schools conformed to them. If they were carried out to the letter, and "continuous attendance on obstetrical hospital practice, under the supervision of a competent officer, for a period of three months, during one month of which at least he should perform the duties of an intern student in a lying-in hospital or ward" were interpreted to mean wholetime attendance for three months (one month in residence) this would be adequate. In a limited subject like obstetrics and gynæcology it is difficult to keep up the student's interest for six months. Three or four months is ample for the purpose.

Were one convinced that this extended training would be the best solution of the problem of the training of the undergraduate in obstetrics, then a supreme effort might be made to carry out the recommendations of the Departmental Committee and of the General Medical Council. But while I agree that the extended training, if carried out in every detail, would improve the training of the undergraduate, I feel that it would do little to make him competent "to conduct safely . . . a complicated case."

THE SOLUTION

What is the solution of this vexed question of the training of the undergraduate in obstetrics? To me it seems that a compulsory period of internship after graduation in medicine, surgery, and obstetrics (four months for each) is the only method of attaining the object in view. For a year the graduate would be permitted to practise only in an institution under the direction of its staff. During this time he would perform the duties of an ordinary resident medical officer. He would receive board and lodgings, but no salary. At the end of this period he would be required to produce a certificate that he had performed his duties to the satisfaction of the medical staff of the hospital in which he served. There is at present great difficulty in securing house surgeons in hospitals other than teaching schools. In many, considerable sums have to be paid for the services of young graduates. The interns would occupy these positions, but be supervised by registrars. This, or a somewhat similar arrangement, as every one knows, has been in operation in some countries for a considerable time, notably, in the form as here suggested, in Canada.

The number of beds available in medicine and surgery in the larger hospitals throughout the country is ample for the purpose. There are many large and important voluntary hospitals in cities in which there is no medical school, and there are the general hospitals now under local health authorities. There should be no difficulty therefore in finding accommodation for the graduate who has to do his four months internship in medicine and surgery. At the moment, however, the supply of obstetric beds may not be sufficient in some centres. This will be remedied in time, as considerable additional maternity beds will have to be provided whenever economic conditions improve.

Considering the three months (four might be better) clinical training in obstetrics, with one month's residence in hospital which all undergraduates must do, would there be any objection to permitting those who definitely desire not to practise obstetrics to "count out" in respect to an internship in obstetrics, on the understanding that should they ever desire later to practise obstetrics, they would have to undergo a clinical training in the subject for a period of four months? This would materially lessen the number which would have to be provided for in obstetrics. Many graduates even at the time of graduation have quite definitely determined to take up some branch of medicine or surgery, or to enter the public health service, or the medical services of the Navy or Army, in which there is no necessity for their having an extended obstetric training.

By the scheme here suggested the individual licensed to practise his profession as a general practitioner will have had (*a*) a three months' course of systematic lectures (fourth year); (*b*) three to four months clinical training (one month in residence) as an undergraduate; (*c*) four months as an intern or house surgeon. He would have done seven months clinical training in obstetrics. But having done it in the manner here suggested, in contradistinction to that recommended by the Departmental Committee and by the Joint Education and Examination Committee (six months undergraduate training), he will be far better trained and qualified to practise obstetrics. Furthermore, those who have no intention of practising obstetrics will not be penalised by having to take a long six months obstetric training. Having had three to four months undergraduate training they can specialise during the period of four months they have "counted out" in obstetrics.

If this arrangement could be put into force—and I think myself that it is feasible—with some temporary adjustments as regards obstetrics, the completed medical curriculum would have produced a safe obstetrician and a better qualified general practitioner as regards medicine and surgery. In effect

we should have re-established a period of apprenticeship, being the year of internship, which all engaged in teaching are convinced is most desirable and which one day must come because in principle it is sound. Far more than that, however, would have been accomplished; every young graduate would have secured the privilege of having been a resident medical officer, which all who have had such experience cherish as the most valuable period of their medical training. To-day, this opportunity is open only to a few.

MEDICINE AND THE LAW

Obstructing a Coroner

THE Court of Criminal Appeal, by the recent decision in R. *v.* Purcy, has made it a little harder to convict anyone in future for the rare offence of obstructing a coroner. A man and his wife and daughter, people in apparently poor circumstances, travelled the countryside from one common lodging-house to another. The daughter had with her a baby born last November. Last February the dead body of the baby was found under a hedge; the child had been seen alive with its mother and grandparents a fortnight earlier but it was then obviously ailing. Its death was not registered. Post-mortem examination showed that it died of natural causes —i.e., broncho-pneumonia, accelerated by neglect. The mother and grandparents were found guilty at Northamptonshire quarter sessions of having obstructed a coroner in the execution of his duty by disposing of the body with intent to prevent an inquest. On appeal (on May 2nd) the conviction was upset. The Lord Chief Justice said the first ingredient in the charge was that the case was one in which a coroner had a duty to hold an inquest. This point had not been established; even if it had been, added Lord Hewart, there had been no evidence of intention to obstruct the coroner.

To ascertain the coroner's duty we must look at Section 3 of the 1887 Act. He is to hold an inquest where two conditions are fulfilled. The first is that he must have information that there is a dead body within his jurisdiction, as there certainly was in the Purcys' case. The second is that there must be reasonable cause to suspect that the deceased died a violent or unnatural death, or else that the deceased died a sudden death of which the cause was unknown. Unknown to whom? The child's mother may have known what the child died of, but the cause must have remained unknown to the coroner (or his officer) until ascertained by post-mortem examination. As the coroner here would probably have used his powers under Section 21 of the 1926 Act—i.e., would have asked for a post-mortem examination and, on the report, would have dispensed with an inquest—he could hardly have been obstructed. The case was not without suspicious features—the apparent concealment of the body, the failure to register death, and the possibility of criminal neglect. Had those features been strong enough, the coroner might have decided at the outset on an inquest, in which event the offence of obstruction would have been possible. The 1926 Act, in enlarging the coroner's discretion, has narrowed the possibility of obstruction. Previously the principal authority on the subject was R. *v.* Stephenson (1884) where two persons were charged with burning the body of a child with intent to prevent an inquest. They were found guilty at Leeds before Hawkins whose summing-up was afterwards called in question. Hawkins had told the jury that it was immaterial that no evidence was produced at the trial to show that the information given to the coroner (which induced him to hold an inquest on the child's body) was in fact true; it was enough if the coroner honestly believed the information to be true, the information being such that, if true, it was his duty to hold the inquest. Further, said Hawkins, if the coroner had rightly decided to hold the inquest, the defendants were guilty of a criminal offence if they secretly obtained, burned, and disposed of the body with intent to prevent the inquest being held and so to obstruct the coroner in the execution of his duty. Hawkins's summing-up was held, on review, to have been correct and the conviction was affirmed. The recent ruling of the Court of Criminal Appeal in R. *v.* Purcy seems to declare that the coroner in the Northamptonshire case would have been wrong in holding an inquest.

IRELAND

(FROM OUR OWN CORRESPONDENT)

THE HOSPITAL SWEEPSTAKES

As stated last week, the Public Hospitals Bill, now before the Dáil, provides that the entire accumulated funds of the available surpluses of the last four sweepstakes should go into a common fund with the proceeds of future sweepstakes, to be disposed of as the Minister for Local Government and Public Health shall decide after receiving the advice of a hospitals commission. The Minister has now agreed to modify this provision, and to set free the sums from the Grand National and Derby sweepstakes of last year for distribution to the participating hospitals. The sum concerned is approximately £1,000,000, and will relieve some of the hospitals of claims which were becoming pressing. Many of the hospitals, counting on the speedy payment of sums which had been "awarded" to them by the Committee of Reference, had entered into commitments as to extensions or new buildings. Others had as yet received no grants whatever. And all had suffered in their general income by the dwindling of voluntary subscriptions and the withholding of grants previously given by public bodies. The hospitals will now probably focus their forces on the attempt to remove another provision of the Bill—the abolition of the proportional distribution (in the ratio of two to one) to the voluntary hospitals and to the rate-supported institutions. As the Bill stands, the voluntary hospitals have no guarantee of getting any money from future sweepstakes, although the sweepstakes will, as hitherto, be organised by them at their risk.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL.—At the annual meeting last week it was reported that last year there were 2644 in-patients, and that the hospital midwives attended 1798 patients in west London. During the year 277 medical students, midwives, and maternity nurses passed through the midwifery training school. It was pointed out that the new isolation hospital, working in conjunction with the Bernhard Baron memorial research laboratories, is the only combined centre for the simultaneous treatment of, and research into, puerperal fever and infections. The proportion of successful treatments rose from 83·9 per cent. in 1931 to 88·8 per cent. There has also been an advance in the treatment of renal infections and pyelitis, by which it is stated the condition can usually be cleared up in from 10 to 14 days. A further development that has been actively prosecuted is the administration of anæsthetics to patients during confinement, and the staff are now being trained to extend these services to the district patients. Expenditure has increased from approximately £26,000 in 1928 to £45,000; in the same period the income has expanded from £24,000 to £44,500. There is still a debt of over £20,000 on the general fund.

PANEL AND CONTRACT PRACTICE

Psychotherapy

THE question as to whether all psychotherapy is to be a specialist service and outside the Act is to be determined by a court of referees on May 18th at the Ministry of Health. It will be remembered that one insurance practitioner in London has claimed that his treatment of four cases by psychotherapy was outside the Act, and that he was therefore entitled to charge fees to the insured persons so treated. The London panel committee agreed with the practitioner; the London insurance committee disagreed. The matter therefore goes to a court of referees set up by the Ministry for decision.

The arguments for and against the inclusion of this service under the Act are many and varied. Just as "surgery" varies in its scope and in the amount of skill and experience required in different cases, so too psychotherapy may be very simple or very expert. It will be interesting to hear the evidence on the point whether attending a course of instruction alone conforms to the regulations. The relevant wording is: "That he has had special academic or post-graduate study of the following subject or subjects which comprise the service rendered, and has had actual recent practice."

The considerations which will doubtless affect the decision is the danger on the one hand of discouraging keen practitioners from following courses of training in new fields of learning which may prove unremunerative, in so far as they will not be allowed to recoup themselves for part of the cost by charging fees for specialist service to insured persons. On the other hand, the ruling must protect the insured person from being charged fees improperly for treatment to which he is entitled. The type of insured person who needs psychotherapy may find it very difficult to make a reasoned decision on any question. The point he may have to decide arises from the following paragraph in G.P. 45, which is signed by the doctor:—

> "And I further declare that before undertaking the service I informed the patient that in my opinion it was not a service to which he or she was entitled as part of medical benefit, and advised him her as to the steps which should be taken to obtain the necessary treatment and that the patient thereupon agreed that I should render the service and receive payment therefor as a matter of private arrangement."

Patients requiring treatment by psychotherapy have generally been the round of many doctors. Would they ever be able to resist the payment of fees suggested by a doctor who says to them in effect: "I can cure you but I shall have to charge you for doing it. Of course I could send you to the psychotherapy department of such and such a hospital where you would be seen by some expert, but you would have to wait about quite a long time, whereas I can make an appointment to see you quite by yourself and without any waiting at all"? This is the position which the insurance committee view with anxiety. It is only proper that a decision should be given by an entirely independent court of referees.

The Medical Card

When an insured person applies to an insurance practitioner for treatment he should produce his medical card. If he does not, the doctor is entitled to make him pay for his treatment and for his medicines by giving a private prescription to the chemist. But the doctor must at the same time give a receipt on the green form R 52, and if the patient fills up this form and sends it to the insurance committee within 14 days, he can reclaim the money paid both for treatment and for medicine. The regulations make no provision for the patient having no medical card who says he has no money to pay fees with.

If one does produce his medical card, the practitioner's first glance should be at the doctor's name written on the bottom of the front page. If his own (or his partner's) name is on the card, he should be able to find amongst his records the corresponding form of medical record (F.M.R.). But no such form may be available, since the patient may be one who has recently moved into his area, and the F.M.R. has not yet been received from his previous insurance doctor. Inconvenience is caused by delay in forwarding F.M.R.'s on demand, which clogs the wheels of the whole insurance machine. If a card is brought to an insurance doctor two or more months after an acceptance and he still has no F.M.R., the card should be returned to the insurance committee marked "No F.M.R."

If there is no name on the card the doctor has then to decide, after giving any necessary treatment, whether he will accept the patient as one of his insured patients. It is worth noting that the keeping of a new medical card in a doctor's possession, even if he makes no statement about accepting the patient on his list, has been held to imply acceptance on his list, dating from the time that he was first shown the medical card by the patient.

If the doctor decides *not* to accept the person as one of his insured patients he must do three things: (1) give necessary treatment, (2) give him the name of some insurance doctor in the locality who might accept him, and (3) inform the insurance committee of the action taken.

It is worth examining cards carefully, and mastering the regulations, for one of the most annoying things that can happen to an insurance doctor is to find after he has accepted a patient and has attended him for weeks that the card is returned marked "Cancelled; approved society states not entitled to benefit." The only hope of being paid for the services he has given is to obtain the fees privately, but there is little chance of this.

Significant remarks may be found printed across medical cards, and are often ignored, such as "Not available before (say) July 1st," or "Available for three months only." The former may apply often to a patient who wishes to change his practitioner without obtaining his consent, and the latter to one who has applied for medical benefit but has not as yet supplied evidence that he is entitled to it.

It is doubtful whether insured persons really understand the importance of a medical card, the rules printed upon it in very small type are so numerous. One insurance committee contemplates issuing with each new medical card a few short injunctions designed to catch the eye and prevent at least the most common errors of procedure.

ELIZABETH GARRETT ANDERSON HOSPITAL.—At the recent annual meeting of this hospital speeches were made by Miss Louisa Garrett Anderson, M.D., daughter of the founder, and Mr. Colin Anderson, a grandson. Major Garrett, the chairman of the economy committee, stated that last year's income exceeded the expenditure by £1395. The overdraft has been reduced by half, and by spending £1000 upon better accommodation for nurses £300 a year formerly paid for lodgings has been saved.

CORRESPONDENCE

ACTION OF RADIUM AS SEEN IN THE PELVIS

To the Editor of THE LANCET

SIR,—Mr. Cade finds the explanation that I and others have suggested of the action of radium and X rays on vascular tissue unacceptable and not in accord with clinical findings, but does not doubt the accuracy of the observations on which these views are based. That the life of cells which have been deprived of their vascular supply is endangered is not merely my interpretation of the histological observations; it is a principle of pathological physiology. If this principle is unacceptable to Mr. Cade it would be interesting to know his views on the functions of the circulation and the means by which cells live and die.

Mr. Cade's clinical observations provoke the following comments:—

1. There is no evidence, so far as I know, that local storage of fat—an inert chemical substance—in lipomata and omentum can be spirited away by radium. Only metabolic processes, fat solvents, and lipolytic agents have so far been shown to have any effect on fat. The permeability of cyst walls and the nature of their contents varies so greatly that it would indeed be surprising if any single agent enabled these contents to be resorbed. According to my observations adenomata are sometimes destroyed in whole or in part by irradiation. But among all these negative attributes of radium is there any foundation for a theory of selective lethal action on malignant cells? I do not see that there is, nor that the observations, except those referring to adenomata, which I would dispute, are relevant to the subject.

2. All are agreed that malignant and normal lymphoid tissue is extremely susceptible to the action of radium and that some epitheliomata are more responsive than others. Do these observations afford a sound basis for a theory of selective lethal action on malignant cells? I do not think that they do. Has the observation that some of these structures fade away in 24–72 hours following irradiation, without any effect on the blood-vessels, included inspection of the area surrounding the tumour? The snippets of tissue usually obtained for biopsy have not formed the material on which I have based my observations of the vascular reaction. Even the most hawk-eyed of observers requires a wider view.

3. There is no doubt that clinical impressions and even X ray pictures can be very misleading. To some they always appear to afford incontrovertible evidence of fact, but others must be allowed to maintain a charitable scepticism.

4. It occurs to me that to a general pathologist the terms periosteal sarcoma and osteoma have a more precise significance than to the surgeon-pathologist, and that one cannot declare with airy insouciance that one type of neoplasm is turned into the other by radium without exact proof. Further, the presence of bone or osteoid tissue in a periosteal sarcoma is not in the least surprising and is not necessarily to be ascribed to the action of radium. It is well known that necrosis and sequestration of bone follows irradiation on some occasions.

No one doubts that different tissues and cells behave differently when irradiated. Not only may the behaviour of a rodent ulcer differ from a squamous-celled carcinoma, but two carcinomata of the same histological type may react differently. It appears to be true that not only is normal brain tissue relatively unaffected by irradiation, but malignant growths in the brain also. I do not doubt that many types of cell, both normal and malignant, are injured by irradiation, and that the nature of their response is varied, but I do not see that Mr. Cade has said anything to prove that radium and X rays exert a direct selective lethal action on malignant cells.

I am, Sir, yours faithfully,

Northwood, May 5th, 1933. B. D. PULLINGER.

GOLD SALTS IN RHEUMATOID ARTHRITIS

To the Editor of THE LANCET

SIR,—In the annotation on this subject in THE LANCET of April 22nd (p. 872) it is stated that "There seems no doubt that we have here a form of treatment which gives definite and lasting benefit. . . ." It is not stated on what evidence this comment is made, although it seems that the Danish publication which is quoted provides this. It is not unusual for the authors of publications dealing with specific methods to speak well of these methods. It may be however that the reference is to some further new work of which it would be interesting to have particulars. My object in raising these points is not merely destructive criticism of a very interesting summary, but a desire to obtain, if possible, further reliable information on a method which has proved by itself disappointing in my own hands during the last two years.

I am, Sir, yours faithfully,

W. S. C. COPEMAN.

Harley-street, W., April 26th, 1933.

*** Dr. Forestier, after following 44 cases treated with gold salts for three years, found that 17 of them became clinically free of symptoms, and the disease showed no sign of progression. In some cases swelling of the joints disappeared and the use of the limbs was restored. But, inasmuch as rheumatoid arthritis may persist for years, after remissions, he did not feel justified in speaking of a cure. Dr. Secher's experience was of a similar nature; and we have been told of cases in this country which give substantial ground for trying injection of gold salts in rheumatoid arthritis, along with other remedies.—ED. L.

SYMPTOMS OF ADDISON'S DISEASE IN THE COURSE OF PULMONARY CARCINOMA

To the Editor of THE LANCET

SIR,—We are indebted to Dr. Bartolozzi for his letter in your issue of April 29th (p. 930). His deep interest and his researches upon these important diseases demand a considered and careful answer. With regard to his inquiry about the condition of the peri-aortic glands of our two cases: in the first we stated they were involved by growth, in the second we omitted to describe them because they were not involved.

The two cases were selected from a group of 13, examined post mortem during the year, which we regarded as examples of primary carcinoma of the lung. Of these, seven showed no adrenal involvement, and of the remaining six the left adrenal was involved in four, the right in one, and both in one. The gross and histological appearances of the lung tumours in our two recorded cases very closely resembled those from certain examples in our larger series in which the adrenals were entirely unaffected, and on this

account we felt justified in the conclusion that the lung was the site of the primary tumour in all the 13 cases, and that the adrenal involvement was metastatic. Dr. Bartolozzi's demonstration of the invasion of the series of lymphatic glands between the adrenals and the lungs does not convince us that we can in this way decide the site of the primary tumour, because the extension of malignancy by the lymph channels may occur in either direction—both with and against the lymphatic stream.

We are, Sir, yours faithfully,

F. JOHN POYNTON,
G. PAYLING WRIGHT,
L. P. E. LAURENT.

May 6th, 1933.

THE SENSATION OF PAIN

To the Editor of THE LANCET

SIR,—Prof. Waterston's article on Pain in your current issue is of great interest to me. He points out that the epidermis is insensitive to pain, the pain-apparatus not approaching nearer the surface than the corium. This seems to explain the fact which I pointed out 14 years ago that pinching the skin and subcutaneous tissue in testing for hyperalgesia gives much more constant results than attempts made by merely stimulating the epidermis.

I am, Sir, yours faithfully,

St. Leonards-on-Sea, May 6th, 1933. DAVID LIGAT.

TESTS FOR RESPIRATORY EFFICIENCY

To the Editor of THE LANCET

SIR,—Dr. Alan Moncrieff's research on this subject (THE LANCET, May 6th, p. 956) and the clinical application of his physiological observations appear to make clearer some of the problems and afford useful indications of their practical utility. I suggest, however, that the effect of rhythmical contraction and dilatation of the smaller bronchi (synchronising with expiration and inspiration) which regulates the degree of distension of the alveoli and the atria, and at the same time the tension of gases therein, is an important factor that cannot be left out of consideration.

When I first drew attention to "The probable Rhythmical Contraction of the Bronchial Muscular Coat as a factor in Pulmonary Disease" (Bristol Med.-Chir. Jour., March, 1903) I suggested that this at least in part is due to the action of the bulbar respiratory centre. Like the alæ nasi and the vocal cords the bronchioles dilate on inspiration for freer entry of air than obtains during the contraction phase on expiration, hence expiration is normally prolonged as compared with inspiration, a part of the air inspired being so to speak locked in. The deeper respiration in exercise is accompanied by wider inspiratory dilatation and correspondingly greater contraction on expiration, hence in exercise (1) the increase in space in the dilated "alveolar ductules" and "atria" of the lungs, (2) the fall in relation of dead space to alveolar air of from 18 to 11 per cent., (3) the increased rate of passing of carbon dioxide into the alveoli and of oxygenation of the blood, owing to increase in gas tension.

It is this normal physiological rhythmical contraction and dilatation of the bronchioles that brings about the aeration of the lungs at birth, and likewise helps to keep the lungs distended during life.

I am, Sir, yours faithfully,

PATRICK WATSON-WILLIAMS.

Bristol, May 8th, 1933.

VISITS TO RUSSIA

To the Editor of THE LANCET

SIR,—It is proposed to organise a tour of doctors and scientists to the U.S.S.R., and the first party will leave London Bridge by Soviet ship for Leningrad on July 1st. The return journey will cost £22–£36 inclusive, according to the type of accommodation selected. The party will spend a total of 12 days in Russia: 3 days in Leningrad, 5 days in Moscow; then there are three alternatives: (*a*) Gorky, down the Volga to Stalingrad, Leningrad; (*b*) Rostov-on-Don, Kharkov, Leningrad; and (*c*) Kharkov, Kiev, Leningrad. Meetings will be arranged, which members of the party will be invited to address, and there will be excursions, with guides, to scientific institutions of interest to members. It is suggested that groups shall consist of about ten in number to facilitate arrangements. Parties may be arranged to leave London at a later date if there is a demand. The latest date for receiving applications for the party leaving London on July 1st is June 15th. All inquiries should be addressed to the secretary of S.C.R., 1, Montague-street, London, W.C.1.

We are, Sir, yours faithfully,

JULIAN HUXLEY,
C. MANSELL-MOULLIN,
JOHN MARRACK.

May 4th, 1933.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE

THE following appointments are notified: Surg. Lt.-Comdrs. R. A. Graff to *Malaya*; C. R. Boland to *Cambrian*; T. Madill and J. J. Mason to *Pembroke* for R.N.B., Chatham; J. P. Patrick to *Victory* for R.N.B., Portsmouth; V. F. Walsh to *President* for Medical Dept., Admiralty; and R. W. Mussen to *Shropshire*.

Surg. Lts. H. D. Plunkett to *Dundalk*; and W. J. F. Guild to *Pembroke* for R.N.B., Chatham.

ROYAL NAVAL VOLUNTEER RESERVE

Proby. Surg. Sub-Lt. A. E. Williams to be Surg. Sub-Lt.
Surg. Sub-Lt. J. M. Ridyard to be Surg. Lt.

ROYAL ARMY MEDICAL CORPS

Lt.-Col. E. T. Potts retires on retd. pay.
Maj. A. H. T. Davis to be Lt.-Col.

TERRITORIAL ARMY

Capt. J. C. C. Howe to be Maj.
J. W. Lobban to be Lt.

INDIAN MEDICAL SERVICE

Lt.-Col. W. T. McCowen to be Col.

The undermentioned appointments are made: Capt. (local Maj.) F. M. Collins, from R.A.M.C., to be Capt.

Bercut Narain Khan to be Capt. (on prob.).

Said Ahmad and Charu Chandra Kapila to be Lts. (on prob.).

ROYAL AIR FORCE

Flight Lt. J. B. Gregor is promoted to the rank of Squadron Leader.

Flight Lt. A. R. French is transferred to the Reserve, Class D (ii.).

Flight Lt. P. J. Nyhan ceases to be employed with the Regular Air Force.

Flight Lt. G. Kinneir relinquishes his temporary commission on completion of service.

Special reserve.—J. L. H. Easton is granted a commission as Flying Officer.

COLONIAL MEDICAL SERVICE

Dr. M. Ellis has been appointed Medical Officer, Nigeria; Dr. F. E. R. Bartholomeuss has been made Medical Superintendent of the Leper Asylum, Hendala, Ceylon; while Dr. C. Sivasithamparam, the retiring superintendent, has been promoted Provincial Surgeon, Ceylon. Dr. W. H. Kauntze, Deputy-Director of the Laboratory Service, Kenya, has been promoted Director of Medical and Sanitary Services, Uganda; and Dr. A. M. W. Rae, Medical Officer, Sierra Leone, becomes Senior Medical Officer, Gold Coast.

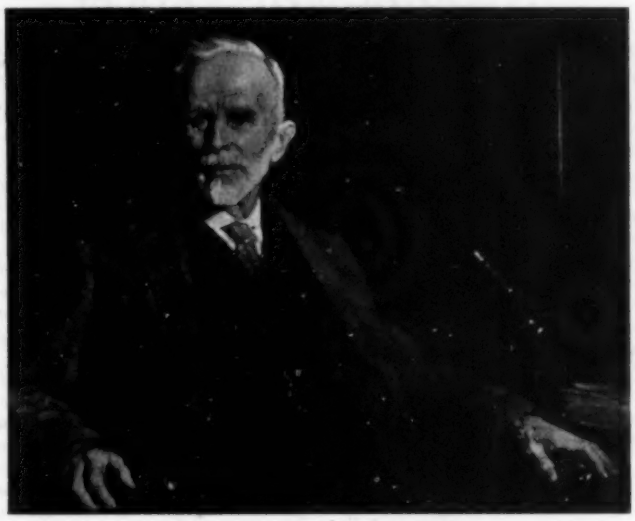
OBITUARY

PRIESTLEY SMITH, F.R.C.S. Eng., LL.D.

EMERITUS PROFESSOR OF OPHTHALMOLOGY, UNIVERSITY OF BIRMINGHAM

THE death at Birmingham on April 30th of Prof. Priestley Smith, at the age of 87 years, closes the career of a man renowned in his profession throughout the world. He was great in clinical ophthalmology, and greater still in research, for he excelled in mechanical aptitude, in appreciation of mechanical principles, in his patience, and in his determination not to theorise without foundation and to form no opinion without being able to bring forward convincing data in its support. His was not research work endowed by public subscription and carried out in laboratories with the help of many assistants; it was that of a man of uncommon insight, done with a minimum of apparatus in a room in his own private house. Unobtrusively as his work was done, it was based on true principles and showed rare ingenuity and thoroughness.

Joseph Priestley Smith was born at Edgbaston in 1845, the son of Mr. Brooke Smith, an active member of the old Birmingham municipality. After leaving school he was apprenticed for four years as a mechanical engineer, acquiring the knowledge of materials and skilled workmanship which stood him later in good stead. But medicine drew him irresistibly and in 1867 he entered Queen's Hospital as a medical student; here he was dresser to Sampson Gamgee and was impressed by his remarkable powers of observation and grasp of detail. A year before he qualified the Franco-German war broke out and Priestley Smith volunteered for hospital work, serving as surgical assistant to the international field hospital at Bingen, and resident medical officer to the tent hospital *Am Thürmchen*. On taking the M.R.C.S. in 1871 he spent two years as house surgeon at the Birmingham and Midland Eye Hospital, followed by a visit to Moorfields. In 1874 he returned to Birmingham as acting ophthalmic surgeon to the Queen's Hospital, followed a few months later by promotion to the office of surgeon, a post he held for nigh on 30 years. Quite early in his career as an oculist he became interested in glaucoma and published the result of his researches in 1878 in a treatise which gained for him the Jacksonian prize of the Royal College of Surgeons of England. It was in following this up that he made the discovery that the lens enlarges progressively until old age; the investigations by which he demonstrated this for the first time were models of what such work should be. He himself spoke of this as the most important work of his life.



PROF. PRIESTLEY SMITH

In 1888 he was asked to open the discussion on glaucoma at the Heidelberg congress, then the most important annual meeting of ophthalmic surgeons.

Now that the essentially mechanical nature of the disease is generally recognised, it is apt to be forgotten how varied and confused were the views held on the pathology of glaucoma when Priestley Smith began to interest himself in the matter. A disease which showed itself in such a perplexing variety of aspects did not seem readily referable to any single cause. At the one end of the series were acute sometimes fulminating attacks which rapidly caused complete blindness, with excruciating pain and congestion suggestive of an inflammatory origin—and indeed for long known as inflammatory glaucoma—and at the other end the insidious chronic non-congestive painless form known as glaucoma simplex. And there were many intermediate forms. It was even difficult to detect, in all cases, the increase in eyeball tension, which was a common characteristic of the condition, while the varying effect of operative interference in different cases and in different hands added to the difficulty of understanding the ætiology of the disease. It was already recognised that iridectomy, though valuable in a disease which before its introduction was incurable, was often not followed by a permanent result. It did not effectually arrest the increased tension. Now that other operations have been found to do so, that a rise of intra-ocular tension is the recognised cause of most of the symptoms of glaucoma, that this rise is known to be connected with conditions affecting the filtration angle of the anterior chamber and that more reliance can now be placed on tonometry, the pathology of glaucoma no longer presents the same interest. But it was otherwise when Priestley Smith began his physical experiments, histological examinations, and clinical study on the subject—carried on without intermission, until long after he had given up active practice. He must be regarded as chief pioneer of its study.

Priestley Smith's work as a teacher began when the Queen's faculty of medicine at Mason College appointed him lecturer in ophthalmology; five years later he succeeded J. V. Solomon as professor. His style was attractive, a blend of the practical and the artistic. Firm but never dogmatic in his convictions he could be impressive in public debate, but excelled rather in discussing privately matters of interest. In 1889 he was Erasmus Wilson lecturer at the R.C.S.; in 1890 he was awarded jointly with Mr. W. A. Brailey the Middlemore prize of the British Medical Association. In 1881 he began to edit the *Ophthalmic*

Review. In 1898 he was Bowman lecturer. In 1901 he was made an honorary Fellow of the R.C.S. of England and later of the corresponding college of Ireland, while the Medical Society of Vienna conferred upon him an honorary membership. Birmingham University gave him the M.Sc. In 1904 he was awarded the Edward Nettleship prize. From 1905–07 he was president of the Ophthalmological Society of the United Kingdom, when, in 1927, eleven years after his retirement he was awarded the Lucien Howe medal of the American Ophthalmological Society, the award was handed to him at his own home by Dr. Wilder, of Chicago, hon. secretary of the society. In 1916 he retired from active practice to leave himself more time to continue experimental and research work, the results of which were published in the *British Journal of Ophthalmology*.

Of Priestley Smith's personal qualities, one who knew him well for many years writes: "His genius, if one may say so, was that of the physicist rather than that of the biologist. True, he was dealing with living tissues, but he was investigating their problems from the mechanical point of view. I can recall occasions when foreign confrères came to Birmingham expecting to see Priestley Smith at the head of a great ophthalmic clinic. Instead, they found an unassuming enthusiast, working with ten beds in a general hospital with the help of a single house surgeon. But quietly as he worked, and unobtrusive as he was, Priestley Smith was a powerful personality. No one could be in his presence without realising this fact. He was forceful and impressive largely because he never advocated the adoption of a particular course without having good reasons for doing so, and also because he had the faculty of being able to state his reasons in a way which carried conviction. He always looked for the simplest explanation of a problem and expressed his meaning in the simplest possible language."

Mr. Priestley Smith married a daughter of Dr. James Russell, physician to the Birmingham General Hospital. The portrait here reproduced was painted by Mr. Harold Speed.

PUBLIC HEALTH SERVICES

Consultants and Specialists at L.C.C. Hospitals

ON May 9th the central public health committee reported to the London County Council on the response to the Council's invitation to consultants and specialists to offer for service under the Council. The report recalls that on March 7th, 1933 (see THE LANCET, March 11th, p. 552), the Council approved salaries, conditions of service, and arrangements to be made as from and including July 1st, 1933, and subject to review at the end of one year, for the engagement of consultants and specialists at grouped general hospitals and institutions, together with such special hospitals, institutions, schools, and homes (under the management of the education and public assistance committees) as could be affiliated to such groups. Applications for engagement as consultants and specialists were invited by public advertisement, and in response there were received approximately 620 applications, of which 6 were subsequently withdrawn.

The applications, the report states, were carefully examined by the medical officer of health, who, in selecting the most suitable candidates, had the assistance amongst others, of:—

Lord Dawson of Penn, P.R.C.P.,
Sir Holburt Waring, P.R.C.S.,
Mr. Comyns Berkeley,
Mr. H. L. Eason,
Dr. T. Watts Eden,
Mr. H. A. T. Fairbank,
Prof. G. E. Gask,
Mr. Somerville Hastings,
Dr. Gordon M. Holmes,
Dr. Robert Hutchison,
Mr. T. B. Layton,
Dr. J. M. H. MacLeod,
Dr. Stanley Melville,
Prof. J. M. Woodburn Morison,
Dr. Donald Paterson,
Dr. G. Riddoch,
Dr. A. C. Roxburgh,
Mr. H. S. Souttar,
Mr. A. E. Webb-Johnson,
Sir William Willcox.

With their help lists were approved containing in all 188 names of candidates suitable for the purpose of engagement as consultants and specialists. These lists are not yet complete. When completed they will form the basis on which final selections and engagements will be made within the number of sessions a week approved by the Council on March 7th. The committee has been advised that from the approved panels of selected candidates it will be possible to arrange for engagements and sessions adequate to the needs of the hospital and affiliated services. In framing the panels special consideration has been given to consultant staff at present engaged by the Council.

On March 7th the Council decided, in order to permit of the bringing into operation of the new scheme for a consultant and specialist service, that with certain exceptions the engagements of consultants and specialists at hospitals and institutions should be terminated on June 30th, 1933. Owing to the work involved in bringing the new scheme into operation, and to the fact that the summer arrangements of many consultants and specialists have already been made, it will probably not be possible for the scheme to be brought fully into working order until some little time later. The committee therefore recommended the Council to suspend the operation of the resolution terminating the existing arrangements so far as to permit of the retention, in cases in which such a course is necessary, beyond June 30th, but in any event not later than Sept. 30th, of the services of consultants and specialists at present engaged in such service.

Death-rates reaching Rock Bottom

In his report for 1932, the first of the annual reports to reach us, the medical officer of health for Reading, Dr. H. J. Milligan, draws the conclusion that the death-rate of the town appears to be becoming stabilised at about 12 per 1000 persons, and that it is unlikely that this rate will show any further material reduction with the present age-distribution of the population. Rather does it appear inevitable that the *crude* death-rate, not only of Reading but of the whole country, must in a few years' time begin to rise. The falling birth- and death-rates over the last half century have led, and are leading yearly, to radical changes in the age-distribution of the population. The proportion of the population at ages 5 to 20 years, when the death-rates are low, is becoming increasingly smaller; the proportion at ages over 45 years, when the death-rates begin to rise steeply, is becoming increasingly larger. These changing proportions cannot fail in time to bring about a rise in the crude death-rate, although improvements in public health and medical sciences may still continue to lower the death-rates at each age. The crude death-rate depends to a considerable

extent upon the age-distribution of the population, and is therefore not a satisfactory measure of secular changes or geographical or occupational differences in mortality. By a comparison of the results of the 1921 and 1931 censuses, Dr. Milligan has emphasised this marked alteration in the age-distribution of the Reading population in recent years. The crude rate of the borough actually shows very little variation during the years of the present century, but, as pointed out, it is not an adequate measure of the doubtless improving health of the town. For that purpose death-rates at ages or a standardised rate are essential.

Other points of interest in this report include the following facts. In 1932 scarlet fever and diphtheria were exceptionally low, it being more than 30 years since the notifications were at an equally low level. Out of 1595 registered births, 1111, or roughly 70 per cent., were exempted from vaccination by statutory declaration of conscientious objection. It is recorded that since 1923 the 5-year-old and the 8-year-old children, examined at the elementary school inspections, have shown a steady rise both in height and weight. In spite of the amount of unemployment which exists the nutrition of the children is stated to remain fairly satisfactory, though capable of improvement in many instances. The infant mortality-rate over the last nine years has averaged only 51 per 1000.

ROYAL SEA-BATHING HOSPITAL, MARGATE.—Lord Athlone, presiding at the annual meeting of the hospital said that the average stay of tuberculous cases discharged last year had fallen; spinal cases fell from 676 to 583 days; and hip-joint cases from 731 to 603. The average number of beds occupied daily was 308.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED APRIL 29TH, 1933

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 33 (last week 18); scarlet fever, 1689; diphtheria, 629; enteric fever, 27; acute pneumonia (primary or influenzal), 927; puerperal fever, 32; puerperal pyrexia, 126; cerebro-spinal fever, 37; acute poliomyelitis, 8; acute polio-encephalitis, 3; encephalitis lethargica, 5; relapsing fever, 1 (Norton R.D., Derbyshire); dysentery, 4; ophthalmia neonatorum, 71. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on May 2nd–3rd was as follows: Small-pox, 64 under treatment, 5 under observation (last week 58 and 1 respectively); scarlet fever, 1553; diphtheria, 1586; enteric fever, 13; measles, 363; whooping-cough, 503; puerperal fever, 16 (plus 7 babies); encephalitis lethargica, 232; poliomyelitis, 2; "other diseases," 291. At St. Margaret's Hospital there were 16 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In 118 great towns, including London, there was no death from small-pox or enteric fever, 52 (2) from measles, 5 (0) from scarlet fever, 32 (8) from whooping-cough, 33 (8) from diphtheria, 53 (10) from diarrhœa and enteritis under two years, and 44 (9) from influenza. The figures in parentheses are those for London itself.

Liverpool reported 9 deaths from measles, Nottingham 7; Birkenhead, Blackburn, Hull, and Birmingham each 3. The deaths from whooping-cough were widely distributed, no less than 7 great towns reporting 2 cases each. Diphtheria accounted for 3 deaths at Manchester. No great town reported more than 3 deaths from diarrhœa except Liverpool with 10.

The number of stillbirths notified during the week was 295 (corresponding to a rate of 42 per 1000 total births), including 47 in London.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

LOCAL GOVERNMENT AND PUBLIC HEALTH

RURAL WATER-SUPPLIES

In the House of Commons on May 8th Viscount ELMLEY moved a resolution praying the Government to keep closely under review the difficulties experienced by local authorities, particularly in rural areas with diminished rateable resources, in dealing with the problems arising from the relief of the unemployed agricultural worker, and the provision of adequate systems of water-supply and sewerage. First-class water-supplies, he said, were important both from the point of view of public health and of general convenience. They had recently seen a terrible example at Malton, in Yorkshire, of what could happen when the water-supply became contaminated. He recently visited a hospital in Norwich where he was shown a large collection of stones cut out of unfortunate people at various times. The reason given for the commonness of that complaint was that the water in the district was exceedingly hard. There was every reason why progress should now be made in the improvement of the water-supplies of the country because the cost of constructional work had diminished and parishes could now get a grant for the purpose from the District Council Fund under the Local Government Act, 1929. According to the report of the Ministry of Health for 1932, in many rural areas the conditions were most unsatisfactory, and in his last report the medical officer of health for Norfolk said that in that county water was mainly obtained from shallow wells which were liable to pollution. Again, according to a report of the Ministry of Health, it was stated that there were many large villages stationary in population which had water-supplies unreliable in times of drought, and always of doubtful quality. In areas where the supply of water was not obtained through pipes the conditions were more primitive and needed special care and supervision which hitherto they had not received. Pollution must be prevented, and the provision of public wells, which were likely to be better constructed and maintained than private wells, should be encouraged.

Mr. LEVY, in seconding the motion, urged that there should be a comprehensive survey with a view to providing a regional water-supply on an area basis.

Mr. TURTON said that Malton was taking steps to ensure that typhoid would not recur, and were, in fact, proposing to deal with the water-supply before the actual outbreak of typhoid. In May, 1932, Malton went in for a large sewage scheme, and the report of the scheme had now been accepted by the Malton local authority. He asked the Minister of Health to use his powers to see that Malton got Government help for carrying through the scheme on economical terms.

AN M.O.H.'S EXPERIENCE

Sir FRANCIS FREMANTLE said that as one who for 14 years acted as a county medical officer of health he recognised the growing necessity for these schemes, and he felt strongly on the subject. For the last 40 or 50 years rural life had been considered by most of the urban population as being merely a by-product of the nation, a moribund part of national life, but it was now recognised to be what the doctors had always tried to impress on the world that it was—namely, absolutely the kernel, the nucleus of a healthy national life. He thought Mr. Levy had exaggerated when he suggested that wretched conditions with regard to water-supplies were representative of the whole countryside. For the greater part, and especially in the areas of the home counties

which he knew, the position was quite the opposite. In general, the villages had a fair standard of sanitation and health arrangements. There was certainly room for improvement, and medical officers of health did not wish to belittle the desire for improvement. But rural conditions must not be judged by an urban standard. It was not necessary in the country to have the ordinary fixed-pipe water-supply for the purposes of health as long as the more primitive arrangements which existed were sanitary and in proper order. No doubt it was a great nuisance to cottagers to have to draw water from a standard some distance from their cottages, or from a well; but it was not essential that there should be anything else. It was quite possible, with modern bacteriological and engineering arrangements, to see that such a water-supply was kept perfectly healthy. The rest was only a question of amenity. The same remark applied to scavenging. They had to secure first of all what was necessary, and they could defer the amenities until they were able to afford them. Those who were connected with the health services during the Great War had to deal with a situation in which there was a great scarcity of necessities. Necessity was there proved to be the mother of invention, and he did not think that the lessons of the war in that respect had yet been sufficiently recognised by sanitary science. It was then found possible to purify water by very simple methods, and also to arrange for scavenging and for the disposal of sewage in simple and effective ways. If it was possible to find some method for providing the necessary money, to be used under proper supervision, for improving rural water-supplies, it would be greatly to the advantage of the countryside, and would also help in the general policy of improving agriculture in this country. But, above all things they must avoid waste, and there was great danger of being parsimonious in one respect and wasteful in another. The county councils could do a great deal more than they had done in helping local authorities. Their help ought to be invaluable in providing against any false relaxation of effort in particular areas. If the county council had done its duty with regard to Malton, and had kept under supervision the conditions reported on by Dr. Bruce Low in 1892, the matter would not have been allowed to rest as it was. The county councils were given the power to report where public health administration was not being properly carried out, and that was the opportunity for them to act, not as a duty, not by sending in a report, but by giving advice of a helpful nature to the local authority, and by acting as it were as a buffer between the local authority and the Ministry of Health. The county councils could do a great deal in that way, and he wished they would do more, but for that purpose they must have the requisite officials. He had always advocated the appointment of county sanitary inspectors. One or two counties had them. Every council ought to have such an official, who was just as necessary as a county medical officer of health. Further education was needed in these matters, especially among the rising generation, to fit them to take their part in the work of local authorities. A certain amount of further publicity was possible. Medical officers of health gave this information in their reports, and he wished something of that sort, possibly couched in more popular language, could be published and made generally available. The Press could also help in that direction.

The Minister's Reply

Sir E. HILTON YOUNG said that the qualified officers of the Ministry of Health were constantly inquiring into the quality and quantity of rural water-supplies and the possibility of improving them. It would not be right or useful to argue there the question of responsibility for so tragic an occurrence as the epidemic of typhoid at Malton. He had satisfied himself that the duties placed on the Ministry were fully discharged as regarded the water-supply of the district and as to the warning of danger. He liked to think that the source and cause of the epidemic was discovered by a most brilliant piece of hygienic detective work by the officials of the Ministry. Measures were being taken for the future protection of the water-supply under the advice of the officials of the Ministry. With regard to the general question of drainage, the best assistance that could be given was the steady pressure in favour of improvement on the part of the Ministry's officials, the ceaseless work without haste of the central administration, and by the local authorities coöperating willingly and seizing all opportunities that were suggested to improve the methods in each case.

MALNUTRITION IN CHILDREN

A close watch had been and would continue to be kept by the Medical Department of the Ministry of Health and the Medical Department of the Board of Education for any sign of malnutrition, especially in those areas where unemployment was most prevalent. A careful scrutiny of the reports of school medical officers of England and Wales for 1931 established that the condition of the children had not really been affected by unemployment. That had been confirmed by his further inquiries in many areas in 1933. The physical condition of the adult varied no doubt in different parts of the country. Generally speaking, it was good, and, contrary to what might reasonably have been expected, did not appear so far to be affected by unemployment. This could be tested by statistics. In 1932 they had one of the lowest death-rates recorded in England and Wales—12 per 1000. They had an exceedingly low infant mortality-rate—about 65 per 1000. They had fewer epidemics and less mortality, and they had, on the whole, a favourable report of the health of insured persons. The medical officers of health were fully alive to the situation, and were vigilant at all times to observe any departure from the normal in their districts. It was their duty to send him a statement of any noteworthy conditions prejudicial to the health of their areas. Those eyes and ears of the Ministry throughout the country enabled the Government to know if there was any definite depreciation in physical condition or increase in morbidity, and he found that there was no positive depreciation to be recorded. The question had occupied and would continue to occupy his day to day attention, and he had taken special steps to secure that any facts which emerged were immediately known.

MATRIMONIAL CAUSES BILL

In the House of Commons on May 5th, Mr. HOLFORD KNIGHT moved the second reading of the Matrimonial Causes Bill. He said that it had been his unhappy lot to receive a large number of letters from all parts of the country which showed that this Bill dealt with a very acute social evil. It sought to give effect to a recommendation 20 years ago of a Royal Commission which successive Governments had disregarded, with the result that there was an accumulation of terrible cases which must be unknown to the House and which, in intensity and seriousness, was incredible unless the circumstances were brought directly to one's attention. The Bill did not impose any pressure on any person to amend his unhappy condition of having an insane spouse. Secondly, the court had to be satisfied beyond a peradventure that the particular person involved in the petition had been incurably and continuously insane for five years. He understood that the only opposition to the Bill was based on religious grounds, and he suggested that that should be left for discussion in committee where it could be more conveniently canvassed than in the House.

Dr. O'DONOVAN moved the rejection of the Bill. It was, he said, a divorce Bill and they had quite enough divorce in this country already. The bond of marriage was not purely a legal one, unless they had gone far from the very old Roman and traditional conception of status. A marriage was far

more than a contract. He questioned whether a motion or a Bill moved in that House necessarily abolished the status in those who acquired it. All those who were insane were by no means insensitive. They knew that in the asylums there were many persons who were properly certified as unfit for release and yet they were conscious of what was going on in the world around them, and the fact that they were certified as incurably insane led to the husband or wife whom they still loved taking to themselves another partner added a very grievous hurt to their present sufferings. Those who were insane were not so, as a rule, through any fault of their own; it was an infliction which came like other diseases. A husband or wife afflicted with incurable insanity had broken no contract; they were sufferers from misfortune. The children, too, had a right to be considered in this matter. It seemed to him for a court to be given the power to dissolve the union and the children not to have a right to say that they wished the union to be maintained, for they were an essential part of the union, was to shut one's eyes to the fundamental cause of the stability of the English State. Much of the efficient practice of this Bill would depend on medical certification. He looked, with some distress, on the possibility that the weaker members of the medical profession might be tempted to give certificates in the same way as those who kept hotels and boarding houses were asked to furnish evidence for a divorce court. One of the most beneficent advances in this country had been the ease with which, in remission of their illness, mental patients were allowed to return to their own homes. That provision would come to a dead end if this Bill went through. Our asylum population, already too large, would be permanently increased, because by not withdrawing patients they might be kept in for the five years. That would hinder their recovery and make the probability of their certification even stronger.

The Bill was "counted out."

HOUSE OF COMMONS

WEDNESDAY, MAY 3RD

Tests for Motor Drivers

Mr. LOVAT-FRASER asked the Minister of Transport if he was aware that many motor accidents were caused by drivers who were incompetent and unfitted to drive; and if he would take steps to secure that licences were only granted to suitable applicants.—Mr. OLIVER STANLEY replied: I assume my hon. friend to suggest that applicants for motor driving licences should be subjected to a driving test. This question was discussed at length when the Road Traffic Act, 1930, was before Parliament, and I do not at present see sufficient justification for introducing amending legislation on the point. I hope that the inquiry which is now proceeding into the causes and circumstances of fatal accidents will throw some light on the extent to which they are due to any want of capacity, on the part of drivers, such as would be disclosed by a driving test.

THURSDAY, MAY 4TH

Scottish Housing Committee

Commander COCHRANE asked the Secretary of State for Scotland whether he was in a position to announce the terms of reference and composition of the departmental committee he proposed to set up regarding the reconditioning of working-class houses and other matters.—Sir G. COLLINS replied: The terms of reference to the committee which has now been appointed are as follows: To consider and report: (*a*) What, if any, further steps are necessary or desirable to secure the maintenance of a proper standard of fitness for human habitation in working-class houses which are neither situate in an area suitable for clearance under Part I. of the Housing (Scotland) Act, 1930, nor suitable for demolition under Section 16 of that Act; and (*b*) What, if any, further steps are necessary or desirable to promote the supply of houses for the working classes, without public charge, through the agency of public utility societies or other bodies subject to similar limitations, operating in particular areas or otherwise.

Sir Thomas Whitson, ex-Lord Provost of the City of Edinburgh, has consented to act as chairman of the committee, and the other members will be: Mr. J. G. Burnett, M.P.; Miss Hoesbrugh, M.P.; Col. Kerr, M.P.; Mr. Maclay, M.P.; Mr. J. S. C. Reid, M.P.; Councillor A. S. McKinlay; Mrs. Shaw, M.P.; Bailie Mrs. Somerville; and Mr. Train, M.P.

MONDAY, MAY 8TH

Medical History Cards

Mr. GLEDHILL asked the Minister of Health the total cost of supplying medical history cards.—Sir E. HILTON YOUNG replied: The cost of printing record cards for use by insurance practitioners during the latest year for which information is available was £1426. The cost of distribution is negligible, as the cards are usually enclosed with other communications sent out regularly by insurance committees to practitioners.

Relief for Distressed Areas

Mr. THORNE asked the Minister of Health whether he could make a statement at an early date in regard to relief for distressed areas; and whether he had received any protests from non-distressed areas with regard to the anticipated alteration of the block grant.—Sir E. HILTON YOUNG replied: I have arranged to discuss this matter this week with representatives of the central associations of local authorities concerned and the London County Council. Representations have been made to me on behalf of certain areas with low poundage rates, and these will be given due weight in the discussions.

Child Marriage in India

Miss RATHBONE asked the Secretary of State for India whether he was aware that the Census Returns already published, for three provinces of India, all showed an enormous increase in child marriage since the previous census, and especially those in Bihar and Orissa; the number of wives and widows under 1 year old had risen from 507 in 1921 to 4959 in 1931; those between 1 and 10 years old from 504,920 to 934,391; and the total under 15 years old from 1,408,618 in 1921 to 2,048,862 in 1931; and whether, in view of these facts, he would direct the Government of India to consider means of strengthening the administration of the law, both with regard to age of marriage and age of consent without marriage.—Sir S. HOARE replied: I am aware of the figures cited by the hon. Member. The questions of the marriage age and the age of consent are constantly under the consideration of the Government of India, and I do not consider it necessary to give any directions on the subject.

National Health Insurance Benefits

Mr. MABANE asked the Minister of Health whether he could give statistics to show the total benefits paid under the national health insurance scheme in Great Britain during 1932; and the expenditure from revenue in relief of the poor, and matters connected therewith, in England and Wales during 1932.—Sir E. HILTON YOUNG replied: The total benefits paid in Great Britain under the National Health Insurance Acts during the calendar year 1932 amounted approximately to £31,850,000. The amount expended in England and Wales on all forms of poor relief for the same period has not been ascertained, but the expenditure during the year ended March 31st, 1932, was about £37,000,000.

TUESDAY, MAY 9TH

Automatic Gas Detectors in Collieries

Mr. THOMAS WILLIAMS asked the Secretary for Mines whether all the tests on automatic gas detectors had been concluded; whether he had yet received reports; and whether copies had been supplied to the Miners' Federation and the producing firms.—Mr. ERNEST BROWN replied: The trials of the Ringrose alarm at Mosley Common, Houghton Main and Waun Llwyd collieries have been concluded. I have received reports from the committees responsible for the two first-mentioned, and I hope to receive the third report in the course of the next week or two. I will decide in what way the reports will be published when I have had an opportunity of considering all three of them together.

QUEEN'S HOSPITAL FOR CHILDREN.—Presiding last week at the annual meeting of this Hackney-road hospital, the Duke of York stated that the bringing into full use of the Princess Elizabeth ward had made it possible to admit a larger number of children than in any previous year, but the number of out-patients and casualty cases made it imperative that more accommodation should be provided. A new out-patient department is to be built in memory of the late Lady Cooper, and in the near future an appeal is to be made for £28,000 for the purpose.

MEDICAL NEWS

Royal College of Physicians of London

Licences to practise were conferred on May 4th upon 59 candidates (58 men and 1 woman) who have passed the final examination of the Conjoint Board and have complied with the by-laws of the College. This list is supplemental to that published in our issue of May 6th. The following are the names and medical schools of the successful candidates:—

G. G. Airey, St. Mary's; D. A. Andersen, Univ. Coll.; W. T. Andrews, Charing Cross; K. S. Ayyar, Madras and Guy's; W. O. Baird, Middlesex; G. F. Barran, Camb. and St. Geo.; W. T. C. Berry, Camb. and St. Bart.'s; N. B. Betts, Camb. and St. Thos.; F. J. Brice, London; G. O. A. Briggs, Camb. and St. Bart.'s; R. H. Carpenter, St. Bart.'s; A. H. Charles, Camb. and St. Geo.; A. G. Cross, Camb. and St. Mary's; H. T. Croudace, Guy's; E. M. Darmady, Camb. and St. Bart.'s; W. Dean, Westminster; P. E. Dipple, St. Bart.'s; R. J. Drummond, Cape and Guy's; G. G. Exner, Guy's; W. L. George, Cardiff and St. Mary's; E. M. Griffin, Camb. and London; T. F. R. Griffin, St. Mary's; T. T. Hardy, Oxf. and St. Thos.; H. C. H. Higginson, St. Bart.'s; H. M. Hodgkin, Camb. and Guy's; E. K. Hole, St. Bart.'s; J. M. Holford, M. I. A. Hunter, and M. J. Ingram, Camb. and St. Geo.; C. W. John, St. Bart.'s; A. E. Jones, Guy's; R. L. Kennedy, St. Mary's; E. S. Lee, Westminster; H. B. Lee, St. Bart.'s; C. A. Lewis, King's Coll.; R. G. Macfarlane, St. Bart.'s; Rosamund M. I. Mackay, Univ. Coll.; R. F. Matthews, Middlesex; A. Miller, Camb. and St. Geo.; P. J. W. Milligan, Oxf. and St. Thos.; M. P. Morel, Camb. and St. Bart.'s; H. Mower, St. Geo.; J. B. C. Murdoch, Camb. and Guy's; A. G. Palin, Oxf. and St. Thos.; J. P. S. Peck, Camb. and London; G. Phipps, St. Thos.; B. V. S. Rao, Mysore and London; R. D. Rowlands, Univ. Coll.; G. E. Scott, Oxf. and St. Thos.; E. P. Sharpey-Schafer, Camb. and Univ. Coll.; J. V. Shemilt, St. Thos.; D. Stephens, St. Bart.'s; R. H. Swinglehurst, Birm. and London; T. P. Thamotheram, Ceylon and King's Coll.; H. B. Tipler, Camb. and London; G. E. H. Tisdall and G. I. Watson, Camb. and St. Thos.; and A. R. Woodforde and C. W. B. Woodham, St. Bart.'s.

Royal College of Physicians of Edinburgh

At a quarterly meeting of the College on May 2nd, Dr. Robert Thin, the president, in the chair, Dr. Robert Lees (Edinburgh) took his seat as a Fellow and Dr. Mohamed Abd El-Hamid Gohar (Cairo), Dr. Douglas Begbie McCrie Lothian (Larbert), Dr. Alfred David Gorman (Blackburn), and Dr. William Ritchie Russell (Edinburgh), were elected to the Fellowship. The Freeland Barbour fellowship was awarded to William Muir, Ph.D.

Dr. John Orr was elected a representative of the College on the committee of management of the triple qualification. Dr. Edwin Matthew was elected representative of the College on the General Medical Council for a period of five years.

University of London

At a meeting of the court on May 3rd it was announced that grants had been made to the university by the Haberdashers' Company (£500), the Saddlers' Company (500 guineas), and the Apothecaries' Society (£500), and would be applied towards meeting the cost of the new ceremonial hall to be erected on the Bloomsbury site.

The Geoffrey Duveen travelling studentship for research in oto-rhino-laryngology will shortly be awarded. The studentship is of the value of £450 a year, and is tenable in the first instance for one year. Only medical graduates of the University of London are eligible. Application forms are to be had from the academic registrar of the University, South Kensington, London, S.W.7.

Fellowship of Medicine and Post-Graduate Medical Association

A course of two lectures on cataract extraction from the point of view of the general practitioner will be given by Lieut.-Col. R. H. Elliot on Wednesdays, May 24th and 31st, at 5 P.M. at the Medical Society of London, 11, Chandos-street, W. A course of four lectures will also be given at the Medical Society of London on Wednesdays at 5 P.M. as follows: June 7th, Dr. Leonard Findlay, Chronic Pulmonary Disease in Childhood; June 14th, Dr. C. P. Symonds, the Disturbance of Cerebral Function in Head Injury; June 21st, Mr. F. J. McCann, the Repair of Injuries to the Perineum and Vaginal Walls (illustrated by the epidiascope); June 28th, Mr. Andrew McAllister, Some Features of Eclampsia. Dr. G. F. Stebbing will give a demonstration of selected cases at the Lambeth Hospital, Brook-street, London, S.E. 11, on Friday, May 26th, at 2 P.M. A course on venereal disease will be held at the London Lock Hospital from May 22nd to June 3rd; a course on gynæcology at the Chelsea Hospital for Women from May 22nd to June 3rd; and a week-end course on diseases of the chest at the Hospital for Consumption, Brompton, on May 27th and 28th. Further particulars and syllabuses may be had from the secretary of the Fellowship at 1, Wimpole-street, W.1.

University of Leeds

It has been decided to confer the honorary degree of D.Sc. on Dr. Robert Muir, F.R.S., professor of pathology in the University of Glasgow.

University of Dublin

The third John Mallet Purser lecture will be delivered by Sir Almroth Wright, F.R.S., honorary Fellow of Trinity College, on Wednesday, May 17th, at 5 P.M. in the department of physiology of the college. The subject of the lecture will be Immunisation—the Old Doctrine and the New.

University of Edinburgh

Prof. Ivan de Burgh Daly, M.D. Camb., who has been appointed by the Curator of Patronage of the University to succeed Sir Edward Sharpey-Schafer in the chair of physiology, was born in 1893.

He was educated at Rossall School and Caius College, Cambridge, taking a first class in the Natural Science Tripos (Part I.) in 1914. During the war he served as flight-lieutenant in the Royal Naval Air Service, and later as a captain in the Royal Air Force Medical Service. He qualified from St. Bartholomew's Hospital in 1918, and after holding the posts of house physician and demonstrator of physiology there was appointed assistant physiologist at University College Hospital, a post which he held in conjunction with a Beit Memorial Research Fellowship till 1923. He then went to Cardiff as lecturer in experimental physiology in the University of Wales and in 1928 was appointed to the chair of physiology in Birmingham, which he now holds. When at University College, London, Prof. Daly worked for a time in the department of cardiology, under Sir Thomas Lewis. His publications include several papers on the heart-lung preparation.

West Kent Medico-Chirurgical Society

The annual dinner of this society will be held at Chiesman's Restaurant, Lewisham, S.E., on Thursday, May 25th, at 7.30 for 8 P.M. Dr. Harold Pritchard, the president, will be in the chair.

Physiological Society

A meeting of this society will be held at the Physiological Laboratory, Cambridge, at 3.30 P.M., to-day, Saturday, May 13th. The communications will include papers by Prof. A. D. Stammers, on the oxygen content, capacity, and percentage saturation in arterial blood at Johannesburg; by Dr. A. E. Barclay, on the mechanics of the human alimentary tract; by Dr. J. W. Thornton and Mr. E. G. White, on some estimations of the blood and urine of the Cambridge 1933 boat-race crew; and by Mr. B. H. C. Matthews, on the human electrocardiogram recorded by the cathode ray oscillograph. There will also be numerous demonstrations. The following meeting will be held in Leeds on June 10th.

Radium Centres

At the annual meeting of the Mount Vernon Hospital, Lord Knollys, who presided, said that owing to the increasing demands for treatment it was essential that the radiological department should be enlarged "with the least possible delay." A number of wards have been provided in which, for an inclusive payment of £5 5s. per week, patients may receive treatment on the most modern lines.—The radium clinic at the Bristol Royal Infirmary, which serves the southern and western counties, has now been in operation for 18 months, and it was reported at the annual meeting last week that during that period 208 patients have been treated. The hospital has its own cancer research department, and the chairman, Lieut.-Colonel P. G. Robinson, stated that "something like 5 per cent. of the patients who received treatment four or five years ago, and were then considered incurable, are still alive and have apparently no trace of the growth."

Post-graduate Courses at a Sanatorium

The Joint Tuberculosis Council informs us that Dr. Peter W. Edwards, medical superintendent of the Cheshire Joint Sanatorium, near Market Drayton, Salop, is prepared to give a series of short intensive post-graduate courses on modern methods of therapy in tuberculosis of the respiratory system with special reference to collapse therapy. In Dr. Edward's sanatorium there is abundant material for the full demonstration of artificial pneumothorax and allied procedures. Methods of sanatorium administration will also be demonstrated. No class will exceed four members in number and suitable arrangements for board and residence can be made within a convenient distance of the sanatorium. Every effort will be made to meet the convenience of intending members, and no course need last more than three days if more time cannot be spared. For details of dates and cost application should be made to Dr. William Brand, 8, Highway-court, Beaconsfield, Bucks.

British Institute of Radiology

Details of the annual general meeting of this institute will be found in our Medical Diary. The medical section is holding its monthly meeting at 5 P.M., on Friday, May 19th, at the house of the institute, 32, Welbeck-street, London, W., when Dr. N. S. Finzi will read a paper on the Treatment of Rodent Ulcers by Radium. All radium officers, whether members of the institute or not, are invited to attend.

Post-graduate Course in Paris

Under the direction of Prof. Maurice Villaret a course on the medical and hydrological treatment of renal, vascular, and humoro-vegetative disorders will be held at the Hôpital Necker, Paris, from June 19th to July 2nd. It will include a visit to Evian, starting on June 30th. Particulars may be had from the laboratoire d'hydrologie of the Faculté de Médecine de Paris (Ecole pratique).

Society of Medical Officers of Health

A provincial meeting of the fever hospital medical services group of this society will be held at the municipal buildings, Park-gates, Poole, on Friday, May 19th, at 4 P.M. A discussion on the position of the smaller provincial fever hospitals in relation to Section 63 of the Local Government Act, 1929, will be introduced by Dr. Maule Horne, medical officer of health and medical superintendent of the Borough Isolation Hospital, Poole.

International Congress of Radiology

The fourth Internationaler Radiologenkongress will be held in Zurich from July 24th–31st, 1934, under the presidency of Prof. H. R. Schinz. The principal subjects of discussion will be the X ray diagnosis of bone tumours, vasography, the development of pulmonary tuberculosis as seen radiologically, radiation for cancer of the uterus and of the mouth and pharynx, radiation genetics, mitogenetic radiation, and identical physical measurement of the dose in X ray and radium treatment. The secretary is Dr. H. E. Walther, Gloriastrasse 14, Zurich.

Cardiological Society of Czecho-Slovakia

This society is holding a congress in Prague from June 2nd to 4th. The president is Prof. V. Libensky (Prague), and the honorary presidents are Sir Thomas Lewis (London), Prof. F. Mares (Prague), and Prof. H. Vaquez (Paris). The principal subject of discussion will be Myocarditis, its Physiology, Pathology, and Therapy. The secretary is Dr. S. Mentl, Policlinique, Myslikova 7, Prague II.

West-End Hospital for Nervous Diseases

This institution had a small surplus at the end of 1932. Sir Leonard Brassey, who presided at the annual meeting last week, referred to the establishment of the first complete child guidance unit as an integral part of a hospital. The juvenile courts, probation officers, school care committees, and local education authorities were availing themselves of the facilities provided by the unit, which has been recognised by the Board of Education as a suitable treatment centre.

Royal Institute of Public Health

The Whitsuntide congress of this institute opens at Eastbourne on Tuesday, May 30th, under the presidency of Lord Leverhulme, who will give an address on public health in relation to industry. The work of the various sections will begin on the following day when Dr. E. G. Annis will open a discussion on the supply of pure milk; Dame Louise McIlroy and Sir Ewen Maclean will introduce the subject of a maternity service; Sir Pendrill Varrier-Jones will speak on tuberculosis as a continuing problem; Prof. Alexander Fleming will give his views on the trend of modern bacteriological research; and the new section of hydrology will consider airs, waters, and places, in their relation to medicine. On the same day there will also be discussions on the rehabilitation of the tuberculous cripple, and the centralisation, or otherwise, of pathological laboratory service; and also numerous individual communications. The chief events of Thursday are debates on health education, the study and care of exceptional children, open-air hospital schools for the tuberculous, the object, time, and place of post-mortem examinations, and soil and climate in relation to rheumatic disease. Sir Frederick Hobday will give an address on veterinary medicine in its relation to public health. On Friday Sir Josiah Stamp will speak on the economic test of the limits of public health expenditure, and there will be symposiums or discussions on housing, biology as a basis for teaching sex hygiene to children, the after-care of the tuberculous, research on cancer, and health and holiday resorts. On Saturday an excursion has been arranged to Pevensey, Battle, and Rye, and on Whit-Sunday delegates and members of the congress will attend service in Eastbourne parish church. Places and institutions which may be visited on earlier days include the Heritage Craft Schools at Chailey and Darvell Hall Sanatorium, Robertsbridge.

Darlington War Memorial Hospital

On Friday last week Prince George opened this hospital, which has been built at a cost of £110,000, to commemorate more than 1000 local men who fell in the late war.

The New Bexhill Hospital

The following appointments have been made to the honorary consultant staff of this hospital, which is being opened on Saturday, May 13th: surgeons, Mr. David Ligat and Mr. W. D. Doherty; ophthalmologist, Dr. G. B. Lowe; pathologist, Dr. P. Lazarus-Barlow; radiologists, Dr. Grellier and Dr. T. D. Overend; oto-rhino-laryngologist, Mr. D. O'C. Cuffey.

Appointments in India

Application is invited for three appointments, tenable by bacteriologists, for research under the Government of India. The All-India Institute of Hygiene, at Calcutta, has vacancies for an assistant professor of public health administration and for professors and assistant professors of biochemistry and nutrition, malariology and rural hygiene, and vital statistics and epidemiology. Particulars will be found in our advertisement columns.

Hospital Libraries

An informal conference for hospital librarians and interested voluntary workers will be held at St. George's Hospital, Hyde Park Corner, London, W., on Thursday, May 18th. The morning session 11 A.M. to 1 P.M., will be devoted to discussions on the growth and aims of the movement, the care and distribution of the books, and the use of publicity. In the afternoon Dame Rachel Crowdy will give an address. Further information may be had from Mrs. M. E. Roberts, secretary of the British Red Cross Society's hospital library, at 48, Queen's-gardens, Lancaster-gate, W.2.

A Clinic for Rheumatism

In 1930 the Greenwich and Woolwich division of the British Red Cross Society opened at 28, Nightingale-place, Woolwich, a clinic for rheumatism and allied diseases. During the three years 1930–32 the average number of cases treated and discharged has been 233, of whom 156 were classified as suffering from rheumatism, 29 from neuritis, and 48 from other complaints. The results are given as: cured 65, better 106, no better 18, unreported 44. Since the clinic opened the total number of attendances has been 4359 and the total number of treatments 9376. The remedies obtainable are massage and exercises, radiant heat, diathermy, galvanism, faradism, sinusoidal current Schnee bath, and ultra-violet irradiation. Pyretic couch treatment, when recommended, is provided at the Seamen's Hospital, Greenwich. All the patients are seen by a visiting physician, who attends once a fortnight, on presentation of a letter or card from a practitioner. Pathological investigations are undertaken at the Seamen's Hospital, and radiological examinations either there or at the Miller General Hospital. The medical officer in charge of the clinic is Dr. John Sainsbury.

Invalid Children's Aid Association

Lord Irwin, who took the chair at the annual meeting held on May 9th at Hampden House, said that though the State was doing more for the rising generation than it formerly conceived to be its duty, private effort gave something which the best State service could not give. The Board of Education recognised seven convalescent homes belonging to the association, and paid grants to them, and as President of the Board there was no direction in which he would rather see expansion at the present time than in the service of these unfortunate children. The need for this service in London continued to grow; the cases helped had risen from about 24,500 in 1931 to over 25,000 in 1932.—The Bishop of Kensington pointed out that of the £50,000 raised last year for the actual running of the association only 9 per cent. had been spent on administration, and there was a balance of over £400. The opening up of new London County Council areas at Edgware and Becontree called for a further extension of the association's work.—Mr. Eric Pearce Gould said that their work had been criticised on the grounds that the bolstering up of crippled lives was biologically unsound. None of us, however, would have survived had it not been for unremitting care when in our youth; in any case, humanity laid so much stress on the importance of individual lives that it was impossible to speak of them in terms of biological values.—Lady Titchfield spoke of the new Health Tribute Scheme established by the association, under which parents whose children had got through the school term without illness agreed to contribute to the association's funds. Twenty-four schools were now on the list, and in some cases the children themselves also made a small contribution.—Mr. H. S. Souttar said that every child who came under the care of the association was looked after individually and found a personal friend in the I.C.A.A. visitor.

Medical Diary

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, May 16th.—5 P.M., Special Meeting of Fellows.

WEDNESDAY.—8.30 P.M., Reception in the Library by the President and Mrs. Warren Low. 9.15 P.M. Dr. R. G. Canti will show a film entitled the Cultivation of Living Tissue Cells in vitro.

THURSDAY.—5 P.M., DERMATOLOGY. (Cases at 4 P.M.) Dr. Hugh Gordon: 1. Acrodermatitis Atrophicans. Dr. J. D. Rolleston: 2. Mongolian Blue Patch. 8.30 P.M., NEUROLOGY. Prof. Ettore Marchiafava: The Degeneration of the Brain in Chronic Alcoholism (to be read in absentia).

FRIDAY.—8.15 P.M., OBSTETRICS AND GYNÆCOLOGY. Specimens: Mr. C. D. Lochrane: 1. Rhabdomyosarcoma of Corpus Uteri. 2. Struma Ovarii. Paper: Dr. Herbert R. Spencer: A Review of Six Hundred and Fifty-eight Ovariotomies.

CHELSEA CLINICAL SOCIETY.

TUESDAY, May 16th.—7.30 P.M. (at the Hotel Rembrandt, Thurloe-place, S.W.), Dinner followed by a discussion on Cranks, Quacks, and Magicians, to be opened by Dr. K. E. Eckenstein.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

FRIDAY, May 19th.—5 P.M. (at 1, Upper Montague-street, Russell-square, W.C.), Discussion on the Responsibility of the Local Authority Towards the Blind. Opened by Dr. E. K. Macdonald.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, Manson House, 26, Portland-place, W.

THURSDAY, May 18th.—8.15 P.M., Dr. C. H. Kellaway, Director of the Walter and Eliza Hall Institute of Research, Melbourne, will read a Paper on Some Peculiarities of Australian Snake Venoms.

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION.

WEDNESDAY, May 17th.—3 P.M. (at the Royal Society of Medicine, 1, Wimpole-street), Dr. Adolf Meyer: Psychiatry and Mental Hygiene (Maudsley lecture).

TUBERCULOSIS ASSOCIATION.

FRIDAY, May 19th.—5.15 P.M. (at the London School of Hygiene, Keppel-street, Gower-street, W.C.), Discussion on the Misapplication of Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, to be opened by Dr. F. R. G. Heaf, Dr. W. E. Lloyd, and Dr. C. H. C. Toussaint.—8.15 P.M., Dr. R. C. Wingfield: The Problems of Relapse.

BRITISH INSTITUTE OF RADIOLOGY, incorporated with the RONTGEN SOCIETY, 32, Welbeck-street, W.

THURSDAY, May 18th.—8 P.M., following a business meeting the following papers will be read: Prof. S. Russ: Variation in the Response of Animal Tumours after Lethal Doses of X Rays. Dr. F. G. Spear and Mr. L. G. Grimmett: The Biological Response to Gamma Rays of Radium as a Function of the Intensity of Radiation. Other papers will be read in title only.

FRIDAY.—11 P.M. to 1 P.M., Visit to the National Hospital for Diseases of the Heart, Westmorland-street, W. 5 P.M., Medical Members meeting. Dr. N. S. Finzi: Treatment of Rodent Ulcers by Radium.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.

MONDAY, May 15th, to SATURDAY, May 20th.—MAUDSLEY HOSPITAL, Denmark Hill. Course in Psychological Medicine, every afternoon.—ST. JOHN'S HOSPITAL, Leicester-square. Course in Dermatology. Clinical instruction every afternoon and evening. Lectures daily at 5 P.M.—ST. PETER'S HOSPITAL, Henrietta-street, Covent Garden. Course in Advanced Urology. All-day instruction given daily.—CITY OF LONDON MATERNITY HOSPITAL, City-road, E.C. Week-end Course in Obstetrics. Instruction given all-day on Sat. and Sun.—QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road. Course in Diseases of Children. All-day instruction.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

MONDAY, May 15th.—10 A.M., Dr. Robert Hutchison: ward visit. 11 A.M., Mr. Eric Lloyd: Common Deformities of the Limbs. 12 NOON, Dr. E. A. Cockayne: The Myopathies. 2 P.M., Dr. Hugh Thursfield: ward visit. 3 P.M., Dr. David Nabarro: Examination of Cerebro-spinal Fluid.

TUESDAY.—10 A.M., Dr. Bertram Shires: X Ray Demonstration of Chest Diseases. 11 A.M., Mr. Denis Browne: Hare-lip and Cleft Palate. 12 NOON, Dr. W. J. Pearson: Feeding the Premature Child. 2 P.M., Dr. R. S. Frew: Meningitis. 3 P.M., Dr. W. W. Payne: Blood-sugar Estimation and Insulin Therapy.

WEDNESDAY.—10 A.M., Mr. L. E. Barrington-Ward: Tuberculous Glands of Neck. 11 A.M., Dr. F. J. Poynton: ward visit. 12 NOON, Dr. Donald Paterson: Dyspepsias of the Second Dentition. 2 P.M., Mr. H. C. Apperly: The Milk Teeth. 3 P.M., Dr. A. G. Signy: Mantoux, Schick, and Dick Tests.

THURSDAY.—10 A.M., Dr. Cockayne: Pyloric Stenosis and Pylorospasm. 11 A.M., Mr. H. Tyrrell-Gray: ward visit. 12 NOON, Dr. W. G. Wyllie: Pulmonary Fibrosis and Bronchiectasis. 2 P.M., Mr. Twistington Higgins and Dr. Harold Sington: Tonsillectomy and its Anæsthesia in Childhood. 3 P.M., Dr. Nabarro: Investigation and Treatment of a Case of Septicæmia.

FRIDAY.—10 A.M., Dr. B. E. Schlesinger: Nutritional Disturbance in Breast and Bottle-fed Infants. 11 A.M., Mr. O. L. Addison: Out-patient demonstration. 12 NOON, Dr. Pearson: Diagnosis of Pulmonary Tubercle. 2 P.M., Dr. Frew: ward visit. 3 P.M., Mr. G. H. McNab.

SATURDAY.—10 A.M., Dr. Paterson: The Premature Infant. 11 A.M., Dr. Reginald Lightwood: Specimens Illustrating Diseases of the Lympho-hæmopoietic System. 12 NOON, Mr. G. G. Penman: Diseases of the Eye in Children.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith-road, W.

MONDAY, May 15th.—10 A.M., Medical and Gynæcological Wards. 11 A.M., Surgical Wards. 2 P.M., Operations, Medical, Surgical, Eye, and Gynæcological Clinics. 4 P.M., Lecture. Dr. Carter Braine: X Ray Therapy.

TUESDAY.—10 A.M., Medical Wards. 11 A.M., Surgical Wards. 2 P.M., Operations, Medical, Surgical, and Throat, Nose, and Ear Clinics. 4.15 P.M., Lecture. Mr. Tyrrell-Gray: Surgery of the Upper Abdomen.

WEDNESDAY.—10 A.M., Medical and Children's Wards, Children's Clinic. 2 P.M., Operations, Medical, and Surgical Clinics.

THURSDAY.—10 A.M., Neurological Clinic. 11.30 A.M., Fracture Clinic. 2 P.M., Operations, Medical, Surgical Eye, and Genito-urinary Clinics.

FRIDAY.—10 A.M., Skin Clinic. 12 noon, Lecture on Treatment. 2 P.M., Operations, Medical, Surgical, and Throat Clinics. 4.15 P.M., Lecture. Mr. Green-Armytage: The Funnel-shaped Pelvis and its Significance.

SATURDAY.—10 A.M., Medical and Surgical Wards, Surgical and Children's Clinics.

The Lectures at 4.15 P.M. are open to all medical practitioners without fee.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.

MONDAY, May 15th.—5 P.M., Dr. J. E. M. Wigley: Napkin Area Eruptions.

WEDNESDAY.—5 P.M., Dr. I. Muende: Pathology Demonstration.

FRIDAY.—5 P.M., Dr. W. Griffith: Bullous Eruptions.

CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.

MONDAY, May 15th, to FRIDAY.—Post-graduate course daily.

ST. PAUL'S HOSPITAL, Endell-street, W.C.

WEDNESDAY, May 17th.—4.30 P.M., Dr. R. J. Clausen: Anæsthesia in Genito-urinary Surgery.

ST. PETER'S HOSPITAL FOR STONE, Henrietta-street, W.C.

WEDNESDAY, May 17th.—3 P.M., Mr. J. A. Andrews: Genital Tuberculosis.

NATIONAL HOSPITAL, Queen-square, W.C.

TUESDAY, May 16th.—6 P.M., Dr. Symonds: Diagnosis of the Causes of Muscular Atrophy in the Hand.

THURSDAY.—6 P.M., Dr. Riddoch: Neurosyphilis.

MANCHESTER ROYAL INFIRMARY.

TUESDAY, May 16th.—4.15 P.M., Dr. T. H. Oliver: Achlorhydria.

FRIDAY.—4.15 P.M., Mr. A. H. Burgess: Demonstration of Surgical Cases.

ROYAL INFIRMARY, Glasgow.

WEDNESDAY, May 17th.—4.15 P.M., Dr. J. C. Middleton: Medical Cases.

Appointments

GRANT, R. A., M.B., Ch.B. Glasg., F.R.C.S. Edin., has been appointed Medical Superintendent, Tranmere Infirmary, Birkenhead.

ROWLANDS, J. S., M.D. Liverp., Certifying Surgeon under the Factory and Workshop Acts for Rhyl, Flint.

WALKER, V. R., M.B., Ch.B. Glasg., D.P.H., Asst. Medical Officer of Health, Walsall.

Births, Marriages, and Deaths

BIRTHS

BARFORD.—On May 1st, at Heather Lodge, Redhill, Surrey, the wife of Dr. L. J. Barford, of a daughter.

DANBY.—On May 7th, at The Homestead, Woodbourne-road, Edgbaston, the wife of Alfred Danby, F.R.C.S. Eng., of a daughter.

DEATHS

DAVIDSON.—On May 1st, at The Rest, Broomieknowe, Lasswade, Mid Lothian, Lieut.-Colonel James Davidson, M.D., D.S.O., Indian Medical Service (retired).

HICKS.—On May 7th, at Ramsgate, Robert Grieve Hicks, M.R.C.S., L.R.C.P.

LYON.—On April 9th, 1933, at Boyndie, Barton Court-avenue, Barton-on-Sea, Hants, Alexander Barclay Lyon, M.D., late of 11, St. Mary Abbot's-terrace, Kensington, W., aged 65.

PETYT.—On May 3rd, at The Chase, Rufford, Dr. Allan I. Petyt, M.A., M.B., J.P., aged 66 years.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

WILLIAM FARR

BY MAJOR GREENWOOD, D.Sc., F.R.C.P., F.R.S.
PROFESSOR OF EPIDEMIOLOGY AND VITAL STATISTICS IN THE UNIVERSITY OF LONDON

THE Duke of Norfolk of Queen Elizabeth's day was beheaded in 1572. "In him," wrote Dr. A. W. Pollard, "perished the last surviving English duke. For more than half a century England had to do its best—defeat the Spanish Armada, conquer Ireland, circumnavigate the globe, lay the foundations of empire, produce the literature of the Elizabethan age—without any ducal assistance."

It is a chastening thought; almost as chastening to me, who (like Dr. Pollard) am a professor, as to recall the names of those who have attained the greatest eminence in intellectual pursuits without any professorial assistance. Even in the oldest of the sciences, mathematics, and within the nineteenth century, Boole and Helmholtz reached immortality without professorial aid. Of the four very great English statisticians, John Graunt and William Farr received no academical training at all; Francis Galton and Karl Pearson had no instructors in statistics.

Of the personality of Graunt we know hardly anything; the gracious figure of Francis Galton lives in the pages of Karl Pearson; Karl Pearson is our honoured contemporary. Farr is in the middle distance, not distinct but not altogether shadowy.

Early Life

William Farr was born on Nov. 30th, 1807, in the Shropshire hamlet Kenley, the son of a farm labourer and his wife, who migrated shortly after William's birth to the village of Dorrington, a few miles out of Shrewsbury. Here they entered the service of a retired cab-proprietor in Bath named Pryce, apparently much on the terms one would expect a married couple to obtain in the service of an elderly bachelor of moderate private means. William, who had two brothers and a sister, became the pet of the old cab-proprietor who paid for his education, such as it was; the local schoolmaster is said to have been "idle and empty headed." Mr. Pryce's books were few and mostly theological, and William had to rely on himself. Many years afterwards he said, "The advantages I enjoyed, the privations and the errors under which I laboured, are obvious. In point of birth I was favoured; my parents were healthy, vigorous, and moral. My intellectual and inquisitive faculties were not developed in a public school, nor by the example and excitement of cultivated minds around me. Left to myself my progress was wayward." By the age of 19 the boy had a stock of miscellaneous information but was not educated in the sense that the headmaster of Shrewsbury School—then, as now, a famous seat of regular education—would have understood the term. Perhaps if William Farr *had* been placed under the care of Dr. Samuel Butler we should have had another Mark Pattison, but no national vital statistics.

A chance conversation led Farr to wish to enter the medical profession. Normally that would have meant going to live in the family of a general practitioner, actually it meant formal indentures to a general practitioner, and real pupilage to an erudite physician in Shrewsbury, a Dr. Webster. "The judicious and enlightened direction, and the elevated tone Dr. Webster gave to my studies, laid the foundation of all I shall ever do that is useful or good."

During the three years, from 1826 to 1829, that William Farr trotted backwards and forwards the seven miles between Dorrington and Shrewsbury, he laid the foundations of that curious, unsystematic erudition which he was to use and display in unexpected fashion.

The self-taught man usually misjudges his relation to others who have enjoyed the advantages (and suffered the disadvantages) of an academic education. He will either over-estimate or under-estimate what others know. If schoolmasters and professors are of any use at all, their pupils acquire some kinds of knowledge more easily than the self-taught; the latter, not realising this, and remembering that *they* acquired knowledge with painful effort, may easily suppose that others would not take the trouble they themselves took and must therefore remain ignorant. But on the other hand, the self-taught might *over-rate* the value of professors—supposing, for argument's sake only, that such a thing were possible—and imagine that the professors' pupils knew much of which the self-taught were ignorant.

Mr. Priestley explains a certain touch of pedantry in another self-taught man of genius, Thomas Love Peacock, "by the fact that not having acquired his learning in the usual way he was always tempted to brandish it in the faces of those who had. He might be said to have been the graduate of a new and unrecognised university, his own, and so to have worn his gown self-consciously and rather aggressively." I am not quite sure how one wears a gown aggressively, but Mr. Priestley implies that Peacock was displaying a defence reaction to the second defect of the self-educated—the secret fear that the regularly taught really do know more than they. Farr had none of this aggressive eruditeness, although perhaps his contemporary Macaulay might have said of him, as of the author of "Haji Baba," that he was fond of quoting passages from Virgil which everybody else knew and did not trouble to quote. But Macaulays are rare, and many quite regularly educated people have both read and remembered much less than Farr.

Another disadvantage or, depending upon the point of view, advantage of self-education is that it encourages general reading and distracts one from the main chance. When Farr's benefactor died and left him, at the age of 21, a legacy of £500 to complete his education, Farr did not behave at all prudently. Instead of immediately setting about to acquire some really impressive letters to add to his signature, he behaved like a sixteenth century scholar, he wandered about the continent learning things not collecting diplomas. Indeed, he sat for no examination at all until four years after receiving his legacy, when he obtained the licence of the Society of Apothecaries, and that was the only examination he ever did undergo—to a modern medical official this must sound like a dream of some Saturnian age. A year later he married and set up in medical practice at 8, Grafton-street, Fitzroy-square.

At Least One Patient

The next six years of Farr's life, the immensely important years from the age of 26 to 32, might be properly handled by a psychologist able to make biographical bricks from very little straw, I can only guess. Even 100 years ago it cost money to house, feed, and clothe a young doctor and his wife; that a country lad with no known connexions in town and very ordinary professional qualifications, would do much in general practice seems unlikely, particularly if he advertised lectures in his private house on so mysterious a subject as "Hygeine" (so spelt). Two of these lectures were printed in THE LANCET; one deals with the sanitary code of Moses, the other with Hippocrates; neither is calculated to attract patients. Old Mr. Pryce's legacy must have been spent by then, and another legacy, from the Shrewsbury physician, did not fall in until 1837. There is evidence (in the shape of a letter to THE LANCET) that Farr had at least one patient, while the author of an early biographical notice (Hare) says that he let lodgings and had a resident pupil. There is also evidence of professional journalism—in the shape

of a favourable notice in THE LANCET of a medical almanack edited by Farr, and of his much more important contribution to McCulloch's book—but there is no evidence at all of a steady means of living. Young Mrs. Farr died of consumption in 1837, and it is not *very* speculative to suggest that the years from 1833 to 1837 were very hard times, that Farr's sympathy with the poor was strengthened by personal experience.

Friends and Patrons

If Farr did not attract patients he did find patrons. First the retired cab-proprietor of Bath, then Dr. Webster of Shrewsbury, then Thomas Wakley, and finally the court physician, Sir James Clark.

Thomas Wakley, the Cobbett of the medical profession, counts, I suggest, for a good deal in the story of Farr. There is evidence that Farr considered himself beholden to Wakley, who not only printed his lectures on "Hygeine," but a long paper on life assurance, and a curious essay on the clinical statistics of cholera. At the end of a laudatory review of Farr's essay in McCulloch's book, THE LANCET printed the following sentences in leading type: "The pages of this Journal have frequently been enriched by statistical contributions of Mr. Farr, and we feel much pleasure in recording our approbation of the article now before us which cannot fail to lay a lasting foundation of honour for its learned author."

Wakley was a formidable person; his cut-and-thrust style was different from Farr's; one cannot feel sure that Farr's strong points would have appealed much to him, but may be confident that Farr's weak points would have irritated him. Wakley, however, was a generous man, fighting the battle of the underdog in the medical profession and outside of it. He had no use at all for pompous ignorance in high places. He even—I am writing of long ago—had no particular reverence for the Royal College of Physicians, and actually jeered at members of the visiting staffs of several London teaching hospitals. Possibly the circumstances of the patientless L.S.A. touched his heart; a hundred years ago, as now, there was much disinterested kindness in the world. Perhaps it was Wakley who brought Farr to the notice of the eminent Dr. James Clark, who was not likely to meet professionally L.S.A.'s practising in Grafton-street. At least Dr. James Clark did employ Farr to help him in the statistical part of a book on consumption which was published in 1835. The same year Clark became physician to the Duchess of Kent and in two years Sir James Clark, physician to Her Majesty, was a very important person. Some people—not, however, particularly competent judges of medical matters—have held that Sir James's handling of the Prince Consort's case many years later altered the course of world history. If it is true that Farr was appointed compiler of abstracts in the new General Register Office (on July 10th, 1839) on Sir James' recommendation, then Sir James did change the course of vital-statistical history effectually.

The Registrar-General's Reports

Although £350 a year, Farr's initial salary, must have been equivalent to more than £600 a year now, neither its amount nor the title of the post suggests that Mr. Farr was officially any more important than the three young gentlemen in the "Internal Navigation Office" of "The Three Clerks." It is true that he was a member of the medical profession, but he was not a physician or a university man, and in 1839 members of the medical profession had not attained that administrative importance which, as all persons who have never worked in government departments know, has long been theirs.

The hand of Farr can, it is true, be detected in the department's reports from the beginning; the second annual report contains his note on the "law" of epidemics which is now classical. But the three reports of the first Registrar-General, T. H. Lister (the brother-in-law of a Secretary of State, as Babbage, who had thought of applying for the post on the irrelevant grounds that he was a considerable mathematician with a taste for statistics, notes), are in the restrained manner which we are still accustomed to associate with blue books. The fourth annual report was signed by the second Registrar-General, Major George Graham (the brother of a Secretary of State, comments Babbage, who on the death of Lister still cherished his delusion), and is also a perfectly correct official document. But between the issues of the fourth and fifth annual reports some psychological revolution took place in the General Register Office. I picture to myself an earnest statesman of the year 1843, perhaps Gladstone in his serious youth on the verge of the cabinet, opening the annual report of the Registrar-General. On p. xvii he finds a properly official table of figures and turns to the text for a properly official explanation; his eyes fall upon these sentences:—

> "The mental faculties, ripened and developed by experience, will not protect the frame from the accelerated and insidious progress of decay; the toil of the labourer, the wear and tear of the artisan, the exhausting passions, the struggles and strains of intellect, and, more than all these, the natural falling off of vitality will reduce the numbers to 9398 by the age of 80. Here we may pause a minute."

We may indeed; the affrighted stateman's eye will travel down the page and be arrested by a Latin quotation. He reads:—

> "After the age of 80 the observations grown uncertain: but, if we admit their accuracy, 1140 will attain the age of 90: 16 will be centenarians: and, of the 100,000, one man and one woman—like the lingering barks of an innumerable convoy—will reach their distant haven in 105 years, and die in 1945.
>
> Crebescunt optatæ auræ, portusque patescit.
> Jam propior . . . . "

"*Can* this be the *Registrar-General*, the brother of my esteemed senior the Rt. Hon. Sir James Graham, writing?" he will ejaculate.

He will find that the report, which makes a cursory allusion to some appended valuable remarks by Mr. Farr, is subscribed:—

> I have the honour to be, Sir,
> Your faithful servant,
> GEORGE GRAHAM.

Perhaps he may close the volume with the thought that a piece of official patronage will shortly be exercised in favour of the brother of another Secretary of State, or even of a Vice-President of the Board of Trade.

An Unofficial Official

He will be wrong. In 1846 the Home Secretary's faithful servant and brother will be found deploring "little children" brought up "in unclean dwellings and impure streets," and "left alone long days by their mothers, to breathe the subtle, sickly vapours—soothed by opium, a more 'cursed' distillation than 'hebenon.'" In 1853 the Registrar-General, in lighter vein and no longer addressing brother James but Sir George Grey (a man of vast and curious erudition), adverts to the curious fact that 1 person in 73 of the population is a Smith, but only 1 in 174 is a Brown and appends—"as a matter of curiosity rather than of practical use"—a four-page list of peculiar surnames, such as Cabbage, Earwaker, and Puddle. This list includes the fictionally classical names of Bultitude, Smallpiece, and Twist. To the end, the Registrar-General's statistical interests and literary style are unlike those of most highly placed civil servants, and similar to those of Mr. William Farr. Farr's "letter" to the Registrar-General, which is the first part of the supplement to the 35th annual report and was written in 1875, begins with this passage:—

> "How the people of England live is one of the most important questions that can be considered; and how—of what causes, and at what ages—they die is scarcely of less account; for it is the complement of the primary question teaching men how to live a longer, healthier, and

happier life. Armed with this golden bough we may enter the gloomy kingdom of the dead, whither have gone in twenty years nine thousand thousand English children, fathers, mothers, sisters, brothers, daughters, sons:

> Matres atque viri, defunctaque corpora vita
> Magnanimum heroum, pueri innuptæque puellæ
> Impositique rogis juvenes ante ora parentum

each having left memories not easily forgotten; and many having biographies full of complicated incidents. Here, fortunately for this inquiry, they appear divested of all colour, form, character, passion, and the infinite individualities of life: by abstraction they are reduced to mere units undergoing changes as purely physical as the setting stars of astronomy or the decomposing atoms of chemistry: and as in those sciences so in this, the analysis of the elementary facts observed in their various relations to time and place will shed new light on the more complicated phenomena of national life."

It is a long stride from the Mr. William Farr "a gentleman of the medical profession" of 1839 to William Farr, Esq., M.D., F.R.S., D.C.L., of 1875, but the latter's literary style has the fruitiness of the Registrar-General's utterances in 1843. In fact, from 1843 to 1880 the publications of the General Register Office, whoever signed them, were the writings of William Farr. How did he get away with it? The explanation is quite simple. If a hundred years ago politicians and the reading public had attached the smallest importance to medical statistics, Farr would never have got away with it at all, and we might never have had the best vital-statistical system of the world. But, precisely because no politician or newspaper proprietor troubled about such things, Farr was given his head by his official chief and when troublesome reformers, such as Edwin Chadwick and John Simon, began to use the formidable ammunition Farr provided for the destructive bombardment of insanitary "interests," it was too late to stop him.

Uses of Jobbery

It would not have been possible for Farr to devote his life to a subject of the utmost importance but not the least interest to the public unless that work of the department which was of immediate practical importance and interest to the public were properly done. Statisticians often talk as if the primary function of the General Register Office were to provide statistical data. Really the *statistics* of the General Register Office are a by-product of the function of preserving *individual* records and issuing copies of these records to fulfil innumerable social and legal obligations. Of course the public at large, that is to say, the individuals out of which it is fashioned, are much more interested in obtaining copies of birth, marriage, and death certificates than in calculations. Unless that side of the work were properly done—the duties are not by any means limited to this—a hundred Farrs at their most eloquent would fail to satisfy the world that the General Register Office functioned properly. That was where Major George Graham came in. No doubt his appointment was a job—if we mean by job appointing a man to a post not because he is known to be the best man for it but because he has a friend at court—no doubt Babbage had much better claims to the appointment, still we may thank heaven that the job was done. Graham made Farr possible and, in spite of the complete absence of jealousy or even a trace of acrimony which has so long characterised the relations of statisticians in all countries, we cannot be *quite* sure that a century ago a properly trained mathematician who had actually been a university professor, would have given the licentiate of the Society of Apothecaries so free a hand as the jobbee gave him.

Even in making appointments to technical posts it seems that jobbery *sometimes* leads to excellent results. To have a brother controlling several seats in the Irish parliament is hardly a better recommendation for military command than to have a brother who is a Secretary of State; to have a sister who is the mistress of the heir apparent is a much less respectable guarantee. Yet the dukes of Wellington and Marlborough are said, by those who understand such things, to have quite attained the standard of the examinees who won or lost the late war.

When Graham died, Farr greatly desired to be allowed to hold office as Registrar-General if only for a year. Nobody who is a sportsman can help regretting that the old man who had made English vital statistics the admiration of the world (I mean, of course, of a few hundred intelligent educated people in different countries) was not granted this satisfaction. It is equally impossible not to rejoice that Graham lived as long as he did, and that Farr was not appointed Registrar-General in the prime of life. Farr's character was too free from cynicism, he was too modest, and too ready to appreciate the work of others to be a successful business man.

> "These qualities," said his official biographer, the late Mr. Noel Humphreys, "made him a somewhat bad judge of character, and exposed him to imposition from scheming speculators, who were desirous of and too frequently obtained his name and support in the furtherance of disastrous financial ventures. For this want of worldly wisdom, and of due caution in putting his actuarial reputation and his money at the mercy of others, he paid dearly."

An unshakable faith in human nature and a record of unsuccessful speculation are worse credentials for the administration of a public department than having a brother a Secretary of State.

Uses of Childlike Faith

But that naïve, childlike faith was an essential quality of a great statistical pioneer. The three great English pioneers, Graunt, Galton, and Farr were all childlike men, in the best sense of the word, all interested in common things, all free from any trace of "high-browedness." It would, of course, be beneath the dignity of any properly educated young mathematical statistician even to refer to such a common person as John Graunt; careerists who acquire reputations by writing on subjects of which they would never have heard unless Galton had lived, may sneer at that great man's eugenic naïvities; Farr's actuarial methods are below the standard of young actuaries of our time. Had Farr been a regularly educated mathematician, had he even been endowed with a portion of the critical spirit and sense of humour of Thomas Love Peacock, the extreme absurdity of some of his aspirations must have struck him.

His ambition was not merely to prepare statistical tables of the numbers and ages of persons who died and to give a distribution in time and place of these deaths. Peacock himself would have agreed that this was a practicable task, within the competence of persons not even members of the medical profession. Farr's ambition was much higher; he wished to apply the numerical method to the study of the *causes* of these deaths, to relate causes of mortality not only to age and sex, season of year, and residence, but to determine the influence of occupation and to assess the value of sanitary legislation. What was his material? The *opinions* of thousands of men whose intellectual powers, professional knowledge, ethical codes, and opportunities of discovering truth varied from individual to individual and from case to case. These opinions were conveyed to him in documents to which the friends and relatives of the dead had access, which any inquisitive person could see for a small payment.

Some of the causes of death might have baffled the diagnosis of a Hippocrates, and the opinions expressed were not those of a Hippocrates but of men of ordinary ability and insight, some of course wise, others ignorant and biased. "Dix millions d'ignorances, ne font pas un savoir" said Taine. How could any calculus transmute a million inaccurate statements into an exact numerical appraisement? Can we really deduce from this codification of partial truths anything at all which we might not have deduced by plain good sense and observation without arithmetic?

The Registrar-General of our own time tells us that 44,789 persons died of "influenza" in 1919,

112,310 in 1918, and only 7283 in 1917. Nobody who was adult in the war years needed the help of the Registrar-General to learn that "influenza" was a great pestilence in 1918, a very serious cause of death in 1919, and relatively unimportant in 1917. The Registrar-General does indeed tell us some things we should not have learned from anybody else. He reports that 29,777 persons died of "old age" in 1919, and that 4 of these ancients were between 45 and 50, 14 between 50 and 55, and 59 between 55 and 60. We can also learn from him that "old age" was epidemic in 1909; no less than 33,975 people succumbed to it in that year, but it was less virulent in 1913 when only 29,801 were cut off. Certainly we did not know this until the Registrar-General told us, and we do not know it now. What is true in these statements is not new to any observant person, and what is new is not true; it is the dull record of vague generalities, dogmatic ignorance, and half-truths; such attributions as "old age," "status lymphaticus," and "pneumonia" (without qualification) illustrate each of these categories. Such would, I think, be the criticism of a Peacock of our own day and, at the beginning of things, almost a century ago, ignorance and bias were surely not less common than now. There have been clever people to whom these absurdities were so vivid that it seemed to them impossible to do what Farr did. It is foolish to suppose that differences of national practice can be fully accounted for by one or two factors. The vast superiority of the vital and medical statistics of England and Wales over those of France is not wholly due to the fact that such men as Laplace, highly trained mathematicians, scornful of the uneducated and confident in their analytical powers, and not a simple-minded enthusiast like Farr, had the ear of the "authorities." But I am sure this was *a* factor. In our own time we have no need to cross the Channel to find persons who have not appreciated the wisdom of old Isaac Todhunter's comment on Condorcet. "Condorcet," said that disturber of schoolboys, "seems really to have fancied that valuable results could be obtained from any data, however imperfect, by using formulæ with an adequate supply of signs of integration."

The Limits of Accuracy

Farr never knew enough about the integral calculus when he was a young man to be tempted to make that mistake, and his sense of the ridiculous was not keen enough to make him recoil from the thought of extracting a *savoir* from any number of *ignorances*. Consequently he lived to demonstrate that Taine's remark is—as probably Burke would have pointed out—just a silly epigram. Of the judgments of ten million *some* will always be *ignorances;* if—by asking questions which only a Hippocrates could answer—we set unreasonably difficult problems, *most* of the judgments will be *ignorances*, but if we do not deliberately make the best enemy of the good, we *shall* extract a practically important *savoir* from what are in a vast majority of cases honestly expressed opinions of normally intelligent persons. In the early reports of the General Register Office, Farr wrote much on the nomenclature of illnesses and their classification and showed a common-sense preference for the immediately practicable before the theoretically desirable.

"Diseases are not always easily distinguished: the symptoms of different species appear simultaneously and are confounded; the nature of the affection is sometimes known, while many of the organs involved are concealed. . . . These obstacles to the accurate determination of disease are inherent in the subject; other sources of inaccuracy may be traced to the incompetency and negligence of the observers. The result so far as it affects registration is the same. It is generally less difficult, however, to determine from the external symptoms the part affected, whether it be the brain, lungs, heart or intestines, than to ascertain whether the lesion be inflammation, tubercles, carcinoma or ulcer; and there are consequently in the returns numerous entries such as 'disease of the heart,' 'disease of the chest,' 'disease of the brain,' 'disease of the liver,' the nature of the disease having been apparently unknown and unspecified."

This is quoted from the first annual report and things being what they were, Farr did not pettishly reject the data but framed a classification which was to a large extent merely topographical. Sixteen years later, in the joint report he prepared with Marc d'Espine, he refuses to seek a formal accuracy to be purchased at the price of a substantial inaccuracy. "Dropsy," for instance, is a term "looked upon with little favour by pathologists," it is a result of disparate biological processes. But if the high-browed official will have none of it, "the refusal to recognise these terms that express imperfect knowledge has an obvious tendency to encourage reckless conjecture."

A Study of Occupation and Health

This willingness to accept what he could get was perhaps the most important of Farr's virtues. Wishing to study the influence of occupational environment upon health, he adopted the simple plan of relating the deaths in the census year to the population as enumerated in occupational groups. Any critically minded man could point out objections to this method. The occupation recorded in a death certificate is the occupation known to the dead man's relations who from ignorance or snobbishness may report a designation altogether different from that which the living man would return in the census form. Then there is the difficulty—which still confronts us—of distinguishing between the industrial and the occupational point of view in *both* sets of data.

I cannot do better than quote the following passage from the General Report on the Census of England and Wales in 1911.

"The present classification of 'occupations' is only truly occupational in parts, being, as regards manufacture, for the most part frankly industrial. Thus the driver of a motor-car is classified as a chauffeur—his occupation; but the workman engaged upon its manufacture is classed either as a motor-car chassis maker or as a motor-car body maker, headings which indicate merely the industry in connexion with which he plies his trade, whether it be that of tinsmith, moulder, fitter, sand-blastman, painter, or what not. The schedule aims at eliciting both types of information and asks for a statement of the precise branch of manufacture and the particular kind of work done. On this occasion, with a view to future revision, a very thorough test was made of the extent to which the departure of the list of 'occupations' from a truly occupational basis is dependent upon the nature of the information on the schedules, and therefore, under the present system of census taking, inevitable. For a large number of the headings in the list, some of the workers under which were believed to be engaged in processes involving special risk to health, cards were prepared upon which the description of the occupation was exactly copied from the schedule, it being hoped by this means to ascertain the numbers subjected to the unhealthy conditions. The attempt was a complete failure, for it was found as a result of the test that such workers commonly describe their calling merely in terms of the article produced, that under which it is classified in our present tables of occupations. Thus there are many separate processes in needle-making, some dangerous to health and others not, but it was found that the great majority of the Redditch workers had described themselves simply as 'needlemakers.' In the case of the Sheffield toolmakers, where it was particularly desired to obtain the distinction of the dangerous processes, the result was better insomuch as a majority described the nature of their work as well as the product, but in this, as in all other cases, the proportion who did not afford the necessary information was so large as to make a truly occupational tabulation impossible."

That was written more than 30 years after Farr's death, and in Farr's time the accuracy of the data was certainly a good deal less than in 1911. His survey (I am quoting from the Supplement to the Thirty-fifth Annual Report) was less elaborate than those now attempted and it has a characteristic quaintness—"The tobacconists, snuff, and tobacco manufacturers suffer very much (i.e., have high rates of mortality) at all the younger ages; indicating clearly enough how prejudicial smoking is

to young men"—but it is always directly to the point:—

"Tool, file, and sawmakers have among them the grinders who suffer so much from sharp particles of stone and steel inhaled into the lungs; their mortality is still high, and at the ages 45 to 65 excessive. The mortality of needle manufacturers at 35–45 is excessively high."

"The earthenware manufacture is one of the unhealthiest trades in the country. At the age of joining it is low; but the mortality after the age of 35 approaches double the average; it is excessively high; it exceeds the mortality of publicans. What can be done to save the men dying so fast in the potteries and engaged in one of our most useful manufactures?"

"Commercial clerks experience an exceptionally high rate of mortality. The rooms in which they work are generally close and ill-ventilated. They often stoop at their desks. They require Sir John Lubbock's holidays."

Those passages were written nearly 60 years ago; industrial silicosis, plumbism, and the conditions of work of commercial clerks have received a good deal of attention since then.

Statistics as an Instrument of Reform

The naif enthusiast doing arithmetic in Somerset House played his part in directing that attention. Perhaps he did not have many readers outside the fellowship of the Statistical Society, but among those readers were Florence Nightingale and John Simon. He encouraged Florence Nightingale to pursue her scheme for the establishment of a professorship of social statistics.[1] *That* dream did not come true until Farr had been dead more than 25 years. He provided John Simon with statistical ammunition for use against insanitation in dwelling-places and work-places and Simon, a better judge of men and much more a man of the world than Farr, accomplished a good deal in Farr's own lifetime. There is no reason to suppose that Simon was intrinsically a better statistician than his energetic predecessor Edwin Chadwick (who perpetrated terrible "howlers" laboriously exposed as such by actuaries and in rather lighter vein by Farr himself) and if Farr had not set out his results in the simple way he did, Simon would have had no use for them.

This was the way in which Farr made the statistical method an instrument of practical reform. One would hardly suppose that these simple methods would be of any use in the field of statistical theory. Surely in those happy hunting grounds of the *real* mathematician, the licentiate of the Society of Apothecaries would not be able to snare even a rabbit! It would indeed be untrue to say that Farr's name is associated with any important improvement of the theory of statistical methods. He did a great deal to familiarise educated persons with the uses to which the method, originally conceived by John Graunt, of a survivorship or life-table, based on population statistics might be put, but I do not know that he contributed anything of particular importance to knowledge of its anatomy and histology. But, by a characteristic piece of simple-minded audacity, he directed the attention of others to a field of statistical research which will one day produce a harvest.

Statistics as a Means of Prediction

Most men are tempted to prophesy if only the winner of the Derby or how much the income-tax will be raised. Politicians are particularly exposed to this temptation. In the autumn of 1865 cattle plague invaded England. In the four weeks ending Nov. 4th, 9597 new cases occurred; in the following four weeks, 18,817; then 33,835, and in the four weeks ending Jan. 27th, 1866, 47,191. Clearly the situation was "extremely grave"; an irresistible temptation to a political Jeremiah in opposition. It is not surprising that early in February the Rt. Hon. Robert Lowe addressed the House of Commons in the following terms:—

"If we do not get the disease under by the middle of April, prepare yourself for a calamity beyond all calculation. You have seen the thing in its infancy. Wait, and you will see the averages, which have been thousands, grow to tens of thousands, for there is no reason why the same terrible law of increase which has prevailed hitherto should not prevail henceforth."

It is not worldly wise for a civil servant to say in a newspaper that a leader of the parliamentary opposition has been talking nonsense, even if only about the cattle plague. But that is what Farr did. He wrote a letter to the *Daily News* on Feb. 16th.

"No one," says Farr, "can express a proposition more clearly than Mr. Lowe; but the clearness of a proposition is no evidence of its truth. And in the present instance I hope to be able to convince Mr. Lowe himself that the proposition which he has propounded is founded on a misconception. It admits of mathematical demonstration that the law of increase which has hitherto prevailed, instead of implying 'that the averages which have been thousands will grow to tens of thousands' implies the reverse; and leads us to expect that the subsidence will begin in the month of March."

Farr then points out that while 18,817 is nearly double 9597, 33,835 is only 179·81 per cent. of 18,817, and 47,191 only 139·47 per cent. of 33,835, so that the "real law" implies a slackening rate of increase. Farr then says that the "Law" (the nature of which he describes with a certain vagueness) will provide in the next six four-weekly periods, 43,182; 21,927; 5226; 494; 16; new cases.

Farr does *not* claim that the "Law" will be an absolutely trustworthy prophet, but only that "The course which it has hitherto taken justifies us in assuming that the attacks will soon be at their maximum."

Farr was right. In the next period of four weeks there were 57,004 new cases, then 27,958, 15,856, 14,734, and (approximately) 5000. These are larger figures that the "Law" demanded; the epidemic subsided more slowly than it postulated. But plainly Farr was a much better prophet than the future Chancellor of the Exchequer.

But what *was* Farr's law? It was the simplest possible relation between the three ratios deducible from the four available figures which one could assume!

I can save any reader of these pages who happens to be familiar with the "shop" of statisticians the fatigue of reading the next paragraph by remarking that Farr simply took the logarithms of the four numbers, obtained the third difference, and built up the series on the assumption that the third difference was constant!

But no knowledge of "shop" is needed to grasp Farr's strategy. He has the four numbers 9597, 18,817, 33,835, and 47,191. He divided the second by the first, the third by the second, and the fourth by the third, and obtained the three ratios 1·9607, 1·7981, and 1·3947. These three numbers are decreasing, and it seemed a fair thing to suppose that the decrease would continue. But how? We might compare the ratios of these ratios—viz., of 1·7981 to 1·9607 and of 1·3947 to 1·7981. If they happened to be equal then one could continue the series of ratios by multiplying 1·3947 by the constant, the product by the constant again, and so on. But they are not equal, they are 0·9171 and 0·7757. These two numbers can again be used to form a ratio which is 0·8458. This is equal to itself, and since there were originally but four numbers, there is no knowing whether if there had been five and we had been able to calculate another ratio this would also have been 0·8458. Farr, optimistic as ever, assumes that it would have been. He multiplies 0·7757 by 0·8458 obtaining 0·65609, and multiplies this by 1·3947. The product is 0·91504. This multiplied into 47,191 produces 43,182—his prediction for the four weeks ending Feb. 24th. He then multiplies 0·65609 by 0·8458 obtaining 0·55492, the product of which with 0·91504 is 0·50777; 0·50777 times 43,182 is 21,927, Farr's next figure. And so on.

One can conceive the horror with which an erudite and cautious actuarial mathematician would regard so audacious an extrapolation. To extrapolate five

[1] See Pearson's Life and Letters of Francis Galton, vol. ii., Cambridge, 1924, p. 416.

terms of a "series" from its first four on the assumption that the third difference of the series (which perhaps is not a "series" at all) is constant, *is* rash. A happy audacity, for its partial success suggested to epidemiologists that the forms of epidemic waves were not capricious and not—as self-esteem might assure sanitary administrators—easily modified by conscious human activity. That idea having been ventilated it was certain that in the fullness of time better mathematicians than Farr—such men as Karl Pearson, Ronald Ross, and John Brownlee (to whom belongs the credit of having first realised the significance of Farr's intuition)—would improve upon his method of description.

I am afraid the reader will think this rather dull and unimportant; to me it seems one of Farr's happiest efforts; *simplex munditiis.*

Achievement

Farr remained in harness until he was past 72 and shortly after retirement his mental and physical powers began to fail. He died on April 14th, 1883. Soon after his retirement the council of the British Medical Association passed this resolution:—

"That the Gold Medal of the Association be awarded by the Committee of Council of the British Medical Association to William Farr, M.D., F.R.S., D.C.L., C.B., as an expression of their high appreciation of his long, unwearied, and successful labours in behalf of statistical and sanitary science; as a recognition of the light he has thrown upon many physiological and pathological problems, and on account of the extraordinary services his work has rendered to the advancement of the health of the nation."

The language of official eulogy does not always approximate so closely to that of unvarnished truth.

THE EVOLUTION OF THE CORSET

THE return to the fashion of designing women's clothes which follows closely the natural lines and contours of the body has given rise to competition in the production of smooth or even seamless belts and of brassières. From the medical point of view, the straight-fronted corsets introduced 20 or 30 years ago were an improvement on those with curved "busks" worn by our grandmothers, because they tended to counteract rather than to encourage visceroptosis. The many varieties of supports which succeeded them have been characterised by a gradual decrease in the number of "bones" and an increase in the width of the elastic separating the rigid parts, to the advantage of free movement of the lower part of the chest. Certain firms, such as Roussel, have for many years been making shaped belts largely composed of closely woven elastic material. Recently brassières shaped so as to cause little distortion of or pressure on the breasts have replaced the tight compressing bandage; and elastic belts made of material, woven round rubber strands, which stretches both ways, form a sheath which has no tendency to ride up during exercise and need not therefore be held down by tight suspenders. The only disadvantage of woven elastic belts, which can safely be worn next to the skin, is that they soon get dirty and that frequent washing or cleaning destroys their elasticity. From this point of view a pure rubber belt has the merit that it can be sponged or even scrubbed without harming its substance. Corsets made entirely of rubber have had a vogue for reducing purposes; when these are worn next to the skin during hard exercise the wearer sweats profusely and is the more conscious of the perspiration because none of it is absorbed by her clothing. These rubber contrivances, which have little to recommend them from the health point of view and may cause sweat rashes, seem to be less popular than they were. Perforated rubber belts, however, appear to be coming into favour for general use. Those marketed by Charnaux are sold with the express injunction that they are not to be worn next to the skin. This is a necessary precaution, the neglect of which in one case known to us led to a definite sweat dermatitis. When worn over an absorbent vest, however, perforated rubber belts provide a smooth easily cleaned support which has fewer drawbacks than most others on the market.

Vacancies

All Saints' Hospital, Austral-street, West-square, S.E.—Res. H.S. At rate of £100.
Ashton-under-Lyne District Infirmary.—H.S. At rate of £150.
Bedford County Hospital.—First and Second H.S. At rate of £165 and £140 respectively.
Blackburn Royal Infirmary.—Res. Surg. O. £250.
Board of Education, Whitehall, S.W.—M.O. £726.
Bolton Royal Infirmary.—H.S. £125.
Brighton, Royal Alexandra Hospital for Sick Children.—H.S. £100.
Burton-on-Trent General Infirmary.—Sen. H.S. £200. Also Cas. O. and H.P. £150.
Calcutta, All India Institute of Hygiene and Public Health.—Professors and Asst. Professors of Biochemistry and Nutrition, Malariology and Rural Hygiene, Vital Statistics and Epidemiology. Rs.725–120/3–1565–135/3–1700/– and Rs. 375–35–1075 a month, respectively. Also Asst. Prof. of P.H. Administration. Rs.375–35–1075 a month.
Canterbury, Kent and Canterbury Hospital.—H.S. At rate of £125.
Cardiff Royal Infirmary.—H.S. At rate of £50.
Chester, East Lancashire Tuberculosis Colony, Barrowmore Hall, Gt. Barrow.—H.P. At rate of £100.
Cobham, Surrey, Schiff Home of Recovery.—Res. Surg. O. At rate of £200.
Elizabeth Garrett Anderson Hospital, Euston-road, N.W.—Jun. Asst. Pathologist. £250. H.P. Obstet. Asst. and Three H.S.'s. Each at rate of £50. Also Two Med. and Surg. Registrars. Each £100.
General Lying-in Hospital, York-road, Lambeth, S.E.—Jun. Res. M.O. and Anæsthetist. At rate of £100.
Greenwich, Dreadnought Hosp.—H.P. and H.S. Each at rate of £110.
Hackney Hospital, High-street, Homerton, E.—Asst. M.O. £350.
Hostel of St. Luke, Fitzroy-sq., W.—Res. M.O. At rate of £200.
India Government.—Three Gazetted Appts. for the Med. Research Dept. Each Rs. 625–Rs.1350 a month.
Indian Research Fund Association.—Research Worker. Rs.1500 per mensem.
Ipswich, East Suffolk and Ipswich Hospital.—H.P. £120.
Leicester Roy. Infirm.—Res. Asst. Anæsthetist. At rate of £250.
Liverpool Hahnemann Hospital, Hope-street.—Res. M.O. At rate of £100.
London Hospital, E.—Asst. Director to Medical Unit.
Luton, Children's Hospital.—Consulting Surgeon and Physician.
Manchester, Ancoats Hospital.—Res. M.O. At rate of £150.
Miller General Hospital, Greenwich-road, S.E.—Cas. O., and Out-patient O. Each at rate of £150. Also H.S., and H.P. Each at rate of £100.
National Hospital for Diseases of the Nervous System, Queen-square, W.C.—H.P. £150.
Newcastle-upon-Tyne Hospital.—Res. H.S. £75.
New End Hospital, Hampstead, N.W.—Asst. M.O. £350.
Oldham Royal Infirmary.—H.P. and Cas. O. At rate of £175.
Park (Fever) Hospital, Hither Green, Lewisham, S.E.—Res. Asst. M.O. £350.
Plymouth, Central Hospital.—Res. H.S. At rate of £150.
Plymouth, S. Devon and E. Cornwall Hospital.—Two H.S.'s. Each at rate of £100.
Princess Louise Kensington Hospital for Children, St. Quintin-avenue, W.—Hon. Dermatologist.
Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Two Res. Anæsthetists. Each at rate of £100. Also Asst. Res. M.O. At rate of £80.
Reading, Royal Berkshire Hospital.—H.S. At rate of £150.
Royal Chest Hospital, City-road, E.C.—Physician.
Royal Free Hospital and London (R.F.H.) School of Medicine for Women, W.C.—Res. Asst. Pathologist. £150.
Royal Free Hospital, Gray's Inn-road, W.C.—First H.S. Also Cas. O. At rate of £150. Also H.P.'s, H.S.'s, and Res. Anæsthetist. Also District Obstetric Asst. At rate of £100.
Royal National Orthopædic Hospital, 234, Gt. Portland-street, W. H.S. At rate of £150.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Hon. Clin. Asst. Also H.S. At rate of £100.
St. Helens Hospital, Lancs.—Jun. H.S. £150.
St. Mary Abbot's Hospital, Marloes-road, Kensington, W.—Sen. Asst. M.O. £500.
St. Mary's Hospital, W.—Cas. H.S. At rate of £100.
St. Thomas's Hospital, S.E.—Surgical Registrar.
Salvation Army, Mothers' Hospital, Lower Clapton-road, E.—Sen. Res. M.O. £150. Also Jun. Res. M.O. At rate of £60.
Sheffield Children's Hospital.—Res. M.O. £175.
Sheffield University, Dept. of Bacteriology.—Jun. Asst. Bacteriologist and Demonstrator. £300.
Southend-on-Sea General Hospital.—Sen. Res. M.O. £300.
Southern Rhodesia, Mental Hosp., Bulawayo.—Med. Supt. £600.
South London Hospital for Women, Clapham Common, S.W.—Third H.S. At rate of £100.
Southport General Infirmary.—Jun. H.S. £150.
University College Hospital, Gower-street, W.C.—Radcliffe Crocker Travelling Scholarship in Dermatology. £280.
Westminster Hospital, Broad Sanctuary, S.W.—Asst. Physician for Diseases of Children.
Windsor, King Edward VII. Hospital.—Two H.S.'s. Each at rate of £100.
York County Hospital.—H.P. £150.